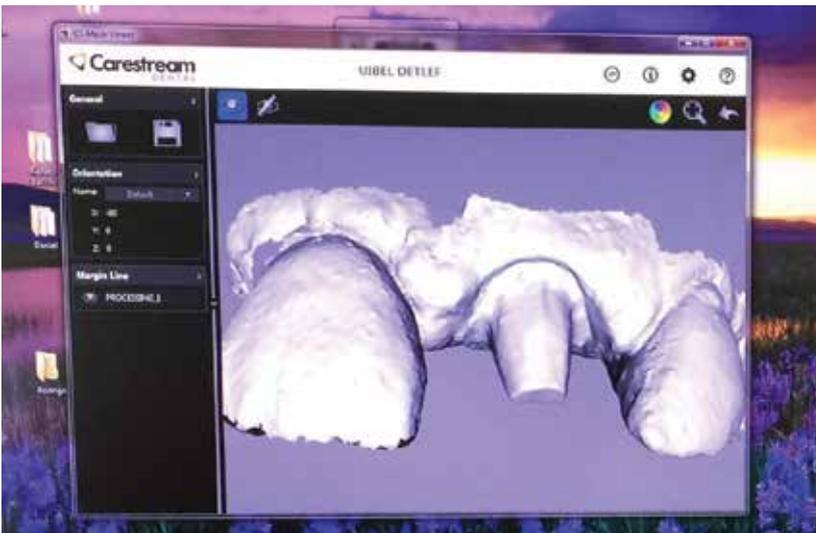


World-Class Competition Requires the Digital Difference

Eduardo Tinoco, D.D.S., Ph.D.



Challenge

Quickly accommodate the dental needs of hundreds of athletes in a temporary facility

Solution

Develop a digital workflow

Technology

- CS 8100 3D extraoral imaging system
- CS 3500 intraoral scanner
- CS 2200 intraoral x-ray system
- CS 7600 imaging plate system



When world-class athletes from around the globe gathered in Brazil in 2016, it's unlikely they were thinking about dental restorations. But for many of them, that's exactly what they got. And for many more, they received mouth guards of a quality they'd never seen before.

The dental work took place in a clinic that was installed specifically for the athletic competition. What makes this story unique is that this temporary dental facility was able to complete the restorations with a one-day turnaround and zero mistakes. They all fit beautifully—and they needed to, based on some of the patients' physical capabilities. "Some of the athletes were really big—over 130 kilos*—and had a very strong bite," said Dr. Eduardo Tinoco, the dentist who led the dental team. "If the occlusal surface had been off even a little, the athlete could shatter the restoration."

What was the secret to this speed and level of accuracy? A digital workflow, lots of preparation and the right partnerships.

CASE STUDY

“The lab’s responsiveness was impressive, with restorations delivered to us the day after they received the digital files. This collaboration was a huge factor in the success of the entire endeavor.”

The Digital Workflow

“We envisioned a workflow where we would do all of the prep work, temporary crowns and intraoral scanning and then send the digital files to a lab via the internet for completion,” said Dr. Tinoco. “We found a lab in Copacabana that was eager to work with us in servicing the athletes,” said Dr. Tinoco. “We were able to collaborate very effectively. The lab’s responsiveness was impressive, with restorations delivered to us the day after they received the digital files. This collaboration was a huge factor in the success of the entire endeavor.”

Twenty-four-hour restorations were not the only surprise the dental team had in store for the competitors. Team members successfully delivered custom mouth guards for athletes participating in high-contact sports—an effort that required more than 400 silicon impressions. “It was an objective of the governing body of the athletic games to provide the athletes with custom mouth guards,” said Dr. Tinoco. “Many people assume that adequate mouth protection is not something the athletes have to worry about,” said Tinoco. “But that is not always the case. Sometimes they have one mouth guard but no back-up. In other cases, their existing mouth guard doesn’t fit properly. Sometimes athletes don’t have access to mouth protection at all. And there’s always the situation of breakage, as well.”

Athletic participants appreciated the access to this level of service. During previous global competitions, only emergency and basic treatments were available. For this one, the level of dental services was brought to a new paradigm: a digital workflow that allowed for high-definition digital images and quick and precise restorations.

For example, the clinic saw many cases of dental trauma, where a crown was fractured and only the root remained. The dental team took a cone beam computed tomography (CBCT) scan with the CS 8100 3D to look for potential root fractures—which would lead to extraction and bone-grafting procedures. But for cases with no root fracture, Justine Tinoco, D.D.S., MSc., performed a single-session endodontic treatment, using the digital images to measure the root length. She placed an intracanal fiber glass post, prepared and scanned the tooth, and seated a ceramic crown in 24 hours.

Upfront Planning, Preparation and Training

Two years before the competition in Rio de Janeiro, Dr. Tinoco and several other competition supporters met with dentists and dental advisors who had participated in previous international athletic competitions, going back as far as 1984. They all shared their success stories and lessons learned, and this transfer of knowledge was very helpful in formulating an effective strategy for the requirements of the Rio competition.

Approximately 10 months before the competition, Dr. Tinoco and the dental team began testing to confirm that all components of the dental workflow were compatible. For example, they wanted to determine the time lapse between sending files and receiving the final ceramic restorations. “We agreed on specific rates and how precisely the restorations should fit,” said Dr. Tinoco. “We also trained on the equipment so that we would avoid mistakes. We knew that if



The dental team fabricated over 400 custom mouth guards using conventional methods. For future international athletic competitions, Dr. Tinoco hopes they will be able to employ a less messy process in producing the mouth guards. One idea is to use the CS 8100 3D to incorporate digital into the workflow, and Dr. Tinoco has already tried it out.

Using himself as a test case. Dr. Tinoco scanned his own impression, generated a file and sent it to Dreve Otoplastik, who quickly fabricated the mouth guard from the file and shipped it to Rio. The mouth guard was a perfect fit—and so was the workflow. And this time the process was dust free.

CASE STUDY



a restoration didn't fit, an athlete might have to return to his or her home country without a successful outcome. We had one chance to get it right." In all, the team completed more than 30 ceramic restorations during the testing process.

Dr. Tinoco was concerned that the technology—which was new to the dentists and dental advisors—might be too difficult to master in the short amount of time they had for training. But he was pleasantly surprised at how quickly they became proficient.

Dr. Tinoco was also amazed at the number of dentists willing to assist during the competition. "We worked with more than 100 dentists," he said. "They were anxious to volunteer because of the technology. They had previously seen intraoral scanning at conferences, but they wanted to test the technology with their own hands. We consider this to be a legacy of the games: the lasting impact of this ground-breaking technology."

The Value of Partnerships

To get everything up and running in a temporary facility in a few months was a tall order. For example, there were no walls which meant every connection had to be made through the floor. Security was very stringent and sometimes slowed the team's progress. "We had to repeatedly answer the question: 'What is this scanner for?'" said Dr. Tinoco.

The team was confident that it could be done, though, because they had chosen to partner with Carestream Dental, who had experience in accomplishing a feat like this one. "We knew they would give us the tools and support we needed to be successful," said Dr. Tinoco.

The dental team found the CS 8100 3D extraoral imaging system to be very intuitive, in terms of use and diagnostics. "It generates very nice images," Dr. Tinoco said. "We had several trauma cases, and we were able to easily detect dental and bone fractures. The system was invaluable for treatment planning as well. If we were dealing with a root fracture, for example, we could plan to do a bone graft or send the image to the athlete's own doctor—something that the athlete found very reassuring."

The doctors used the CS 8100 3D to combine panoramic imaging with 3D imaging for trauma cases. With the additional information revealed by the 3D scan, the team could make a more accurate diagnosis and easily determine the best type of treatment.

One athlete broke a crown just a few days before his competition. He was feeling very hesitant about participating with a broken tooth in the esthetic region. But thanks to the CS 3500 intraoral scanner, the team was able to prep, scan and finish his case in one day. They actually did several cases using the same approach.

That's a Lot of Scanning

Over the course of the competition:
CS 8100 3D: 800+ images
CS 3500: ~75 scans

CASE STUDY

*"The option to save time and be more precise compels me to choose digital.
These are magical words for dentists."*

"In several instances, we sent images to the athletes' doctors in their home country over the internet," said Dr. Tinoco. "Not only did it save time, but this capability increased the athletes' confidence in our diagnoses."

The dental clinic had eight operatories, which highlighted another benefit of the CS 3500 intraoral scanner: portability. The practitioners could go from one room to another very easily.

The Future is Digital

Dr. Tinoco believes oral health practitioners will be using digital increasingly over time. Once they see the level of accuracy and precision that's achievable with the digital scanner and the problems they can avoid with distorted impressions, they will never go back. "The option to save time and be more precise compels me to choose digital," said Dr. Tinoco. "These are magical words for dentists. Practitioners will integrate the digital workflow into their offices on a daily basis. This is the future of dentistry."

Eduardo Tinoco, D.D.S., Ph. D.



Eduardo Tinoco, D.D.S., Ph. D., is an associate professor at the University of Rio de Janeiro. He graduated from the Federal University of Rio where he specialized in periodontics. He then earned his Ph. D. in dentistry at the University of Oslo in Norway. Dr. Tinoco is himself a former athlete. He practiced high jump and played beach volleyball for Brazil many years ago.

To learn more, go to carestreamdental.com.