

Exclusive Preview:

E4D CAD/CAM Restorative System

By Thomas Giacobbi, DDS, FAGD
Editorial Director, *Dentaltown Magazine*

On September 23rd, Drs. Sameer Puri, Michael Colleran, Allen Mead, Michael Espisito and I visited D4D Technologies Headquarters in Richardson, Texas, to get a first hand look at the development of the E4D CAD/CAM Restorative System.

During our visit, we met with Jorey Chernett, President/COO of D4D Technologies, Al Simon, Director of CAD/CAM Technologies for Henry Schein and members of the D4D development staff. We had a tour of their facility including all Research & Development areas, an informative presentation on their progress to date, and a LIVE demonstration of the E4D system.

This meeting answered many questions and sparked a few new ones as well. I researched the message board discussions of this technology and I discovered many myths and unanswered questions. I phoned our new friends at D4D Technologies and asked if they would be willing to answer my questions about their new CAD/CAM technology. This exclusive interview with *Dentaltown Magazine* will clear up some misconceptions, and provide a preview of this breakthrough technology.

DT: What is the official product name?

D4D: E4D CAD/CAM Restorative System.

DT: Who is D4D Technologies?

D4D: We are a technology company developing imaging and milling solutions for the dental industry. Our flagship product is the E4D CAD/CAM system targeted at dentists and dental laboratories. We are based in Richardson, Texas, and employ approximately 50 people, consisting of a broad range of engineering expertise, including electrical, mechanical, optical, optomechanical and software engineers, in addition to physicists, mathematicians, and material scientists. Equally as important, we employ a range of clinical, service and support, and operations talent.

DT: How did D4D become involved in creating this machine?

D4D: D4D was founded approximately three years ago by Basil Haymann (Founder, Chairman and CEO of D4D) after meeting Mark and Henley Quadling (Co-founders and Co-Chief Technology Officers). Mark and Henley have extensive background in 3D digitizing and CAD/CAM technologies, having previously served as consultants for several dental and non-dental manufacturers.

DT: How long has the E4D been in development?

D4D: While the E4D has been officially in development for three years, much of the proprietary techniques and “know how” have been acquired over a much longer period of time.

DT: What is the relationship between D4D and Sullivan-Schein?

D4D: Sullivan-Schein is the Exclusive Distributor of the E4D CAD/CAM System.

DT: What does this mean for customers of other suppliers?

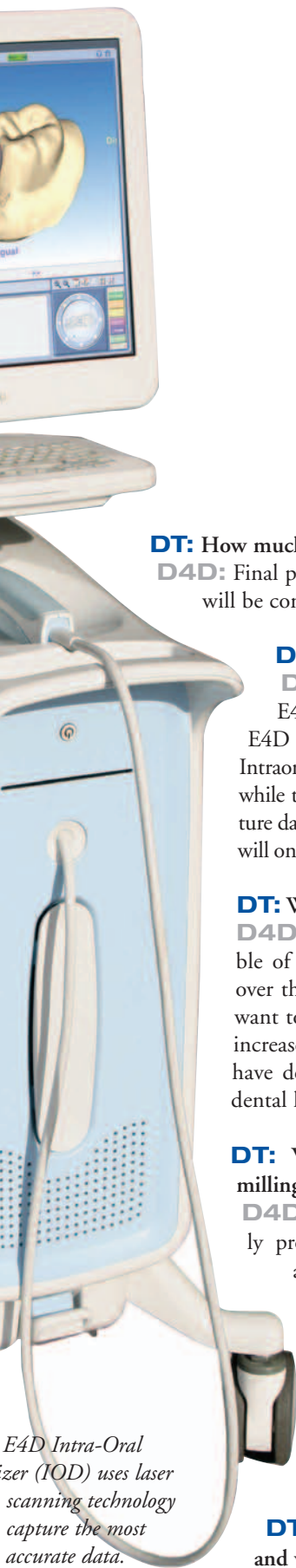
D4D: Any dentist who invests in an E4D System is a very good Schein customer and will be provided with the highest levels of customer service.

DT: Is there a waiting list to purchase?

D4D: We do have a list of customers who have insisted on being one of the first to own an E4D. Anyone can be placed on the list by calling his/her local Schein representative.



The
Digit
based
to



E4D Intra-Oral Scanner (IOD) uses laser scanning technology capture the most accurate data.



DT: How much will it cost?

D4D: Final pricing has not been established; however, E4D will be competitively priced.

DT: Is the E4D suitable for use in a dental lab?

D4D: D4D will be providing two versions of the E4D CAD/CAM System; the E4D Dentist and the E4D Laboratory. The dentist version will use an Intraoral Scanner to capture data directly in the mouth while the lab version uses a Bench Top Scanner to capture data from a standard model. The laboratory version will only be available for purchase by dental laboratories.

DT: Will I be able to make gold crowns with the E4D?

D4D: While the E4D CAD/CAM System is capable of milling precious metals, our market research over the last two years indicates that dentists do not want to deal with issues such as gold inventories and increased time for polishing. For those reasons, we have decided to limit the use of precious metals to dental laboratories.

DT: What materials will be available for the milling unit?

D4D: We will be providing a wide range of clinically proven materials including ceramic, composite and provisional restorative materials. The laboratory system will include the same materials offered with the Dentist system plus a variety of ceramics intended for substructures as well as metals. We will continue to work with our material partners to ensure we are providing the most compelling range of restorative materials in the future.

DT: Have any cases been done on live patients and what clinical data have you gathered?

D4D: Beginning this past September we began to place restorations on live patients. We are in the process of building a library of clinical cases and will make photos available in the near future. We are in the process of finalizing clinical protocols with several leading universities.

DT: Please describe your plan for training and support of this new technology.

D4D: D4D and Sullivan-Schein believe that successful integration of the E4D CAD/CAM System into the dental practice will rely heavily on exceptional support and training. The E4D System will take advantage of three levels of support; a) A highly trained, dedicated group of field sales consultants; b) D4D Technical Support that can be accessed by telephone or through the Internet, and; c) the Schein Service Group ("Sullivan-Schein Pro Service") that, if necessary, will have a technician dispatched to the office within hours. D4D has developed an initial training program that allows the entire dental team to become part of the integration process. It will be accomplished in three phases; a) Full-day, in-office training will be accomplished on installation day and will involve all members of the dental team; 2) A self-study program called, "Pathway to Success" that will continue to teach the dentist and staff the basics of the E4D, and; 3) The dentist and a staff member will attend a 2.5 day, hands-on course taught by a "wet-fingered" dentist at E4D University, a dedicated training facility located at D4D Headquarters just outside of Dallas, Texas.

DT: How is your imaging process different from other CAD/CAM machines?

D4D: The E4D CAD/CAM System uses an intraoral laser scanner to capture data. Laser scanning has always been the preferred method of scanning, but until now, due to inherent technical limitations lasers have not provided the accuracy required for dental restorations. A core part of our intellectual property deals with circumventing these inherent limitations and thus enabling intraoral laser based scanning.

continued on page 64

DT: Is the laser scanner accurate without the use of powder?

D4D: The E4D laser technology has been designed to eliminate the need for powder or other reflective agents. The finished restoration will be accurate to less than 50 microns.

DT: Why do you require multiple photos of a preparation?

D4D: If you are scanning an inlay, it is not possible for any camera to capture all the data from a single occlusal view, therefore, data regarding additional surfaces is an interpretation. The use of real data, instead of an interpretation, helps to provide increased accuracy.

DT: The milling unit of the E4D appears very large. Does it need to be this big?

D4D: You are only as good as your weakest link, in other words, it does not matter how accurate the scanning and design phase is if the milling machine cannot reproduce the design. We spent a great deal of R&D time understanding the challenges associated with milling a variety of dental materials. The design is very robust, but fits within the footprint requirements of a typical dental office counter. The rigid, mechanically stiff design enhances accuracy and cuts down on vibrations. It is important to minimize vibrations, or "chatter," which can produce inaccuracies or lead to a greater number of micro fractures when milling a ceramic restoration. In addition, the milling center utilizes an automatic tool changer that further enhances speed and accuracy by changing from a coarser bulk reduction tool to a finer finishing tool. The milling center features a fully functional embedded Windows XP computer that enabled us to create custom milling paths for each of the restorative materials we will be offering. These cus-

tom milling paths also help to optimize the speed, accuracy and surface characteristics of the restorative materials.

DT: How did you decide where you could improve on the current dental CAD/CAM milling technology available?

D4D: D4D, as well as Sullivan-Schein, are driven by identifying the customer's needs. During the development process we have continually gone back to dentists and dental laboratories for feedback. We learned early on in the process about the customers' "pain points" and have developed our system accordingly, in order to provide the market with a product that addresses these concerns.

DT: Many Townies are wondering why there have been so many delays with this project?

D4D: There is no one thing in particular that we can point to and say "this is why we're late," but rather it is a function of developing a complex medical device that touches on every single engineering discipline and requires significant testing before being released into the marketplace. We've always said and remain committed to not launching the system until it is truly ready. In addition, it's certainly not in the best interest of D4D, Schein, our consumable partners and most importantly the customer to launch the product before it's ready, even if it results in criticism because of a delay. We believe our technology is unique and will be worth the wait. Currently, we expect to begin shipments of the E4D System late first quarter or second quarter of 2006.

DT: If you would like to receive more information about the E4D CAD/CAM system please contact the company via e-mail: e4d@henryschein.com.



The E4D Milling Center utilizes an Automatic Tool Changer and custom milling paths to optimize accuracy, cutting efficiency and milling times.

