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Editorial

Upate on CAD/CAM

In the January/March, 1987, issue of **Journal of Dental Practice Administration**, you read of the "French Revolution." I wrote of Dr. Francois Duret and his development of the laser probe, using it in combination with the computer and a micro-milling machine to fabricate crowns, inlays, and bridges for immediate insertion in the patient's mouth, without the necessity of conventional impressions or temporary crowns and without the need for a second or third visit for the insertion of the restoration. At that point in time, I envisioned the future of the project without having a first-hand observation or hands-on experience. This has now changed, and this report is an update of the progress of the Duret CAD/CAM System.

Since 1987, I have had a growing relationship with Dr. Duret. I have had the opportunity of knowing him as a peer, inventor, dentist, and, above all, as a human being. His scientific knowledge is astounding. His grasp of all of the areas involved in the development and growth of the project, lasers, optics, and computers, is remarkable. His knowledge of the dynamics of occlusion and the development of an articulating device that is programmed with the computer is amazing. His knowledge of color as it relates to tooth color, and the development of an instrument to measure and display the color of the tooth through the computer, is of great potential.

In addition to these facts, I have had the opportunity in the last 5 months of visiting France and seeing first-hand the entire system in operation on two separate occasions. During the first visit last September, I spent a week with Dr. Duret and the people in the Hennson organization, getting to know the basic concepts of the instrumentation. The team that has been assembled and has worked on this project for 5 years consists of engineers and technicians coming from various disciplines, such as lasers, optics, electronics, computer programming, and numerical control, to name a few. This well-integrated group has developed a unique know-how which, I believe, will soon be recognized by the profession. By the time this article is published, Dr. Duret will have given a live TV broadcast at the Chicago Mid-Winter meeting and will have presented demonstrations of the system to small groups of dentists from around the country.

My second visit with Dr. Duret, in January, 1989, was spent in a hands-on approach, learning how to use the probe, which is basically a hand-held mini camera with laser light and unbelievable depth-of-field capabilities. The pictures taken by the probe are sent directly to a computer, which immediately displays on a monitor the sequence of pictures taken. These pictures are then viewed by the operator and the environment defined on the video screen for further processing by the computer. The design of the restoration then takes place on the screen, and is an absolute marvel. The operator has the ability to take from the memory bank a theoretical tooth and actually deform and mold it to fit the margin that has been established to the contact areas and to the occlusion. To be able to use various types of occlusal approaches, to be able to move on the screen a cusp, a fossa, a groove, a buccal or lingual contour, as if one was carving a wax pattern, is truly astrounding. The information of the designed restoration is now transferred directly to the four-axis micro-milling device for precision milling. The material to be milled includes a wide range of familiar dental materials, but most interesting was a factory-made material derived from space technology.

Part of the week was spent under the direct teaching of Dr. Duret. He spoke each day for about an hour and a half of the purely scientific and theoretical background. The education given to me on the system was done by Dr. Christine Frequelin. She received her dental degree 5 years ago and spent 5 years in the clinical practice of the profession. She had been with the Duret team for about 6 months and was computer illiterate on assuming her position with the team. In those 6 months, Dr. Frequelin achieved a complete understanding of the system and was now able to teach an older American dentist, without computer ability, to produce a fine restoration via CAD/CAM. This is important for two reasons. First, with a minimum of training, I feel confident that the general dentist in the United States can readily operate the system, although his computer background is minimal. Second, it proved to me the assured future that our young professionals have in "Computerized Dentistry."

I am most grateful for the opportunities afforded me and of the fact that I have had a hands-on experience about which to talk, write, and compare. The Duret System will be further developed in the near future at U.S.C., where Dr. Duret has been given the title of Research Professor of Dentistry. Together with Dr. Jack Preston, he will further refine the clinical applications and material testing that is needed. To say that the Duret System is flawless would not be true. The flaws that exist, I am certain, will be eliminated by Dr. Duret, Dr. Preston, and their team.

The future of CAD/CAM is now.

Arthur G. Williams, D.D.S.
Editor