Simplified digital impression-taking

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Dental Tribune
United Kingdom Edition
April 27-May 3, 2000

As the only system in the world that uses the principle of triangulation for intra-oral measurements, the Cerec system is setting higher standards in CAD/DAM technology with Cerec AC and the Cerec Bluecam camera. Never before have intra-oral scans been made as fast, sharp, or accurately in 3-D. Whole-jaw images broaden the indication spectrum and, with virtual models, allow the dental office and the dental laboratory to work together impression-free.

The acquisition unit of the CEREC 5D system – called CEREC AC (acquisition center) – has been equipped with a new camera (Bluecam). CEREC AC replaces the previous CEREC 5 acquisition unit; however, the new CEREC 5 unit is still compatible with the CEREC 5 camera. CEREC AC is compatible with both milling units – CEREC 3 milling unit and CEREC MC XL (extra large).

The advantages of an improved intra-oral image-capturing system do not stop at producing larger restorations chairside. The simplified inclusion of the adjacent teeth and the opposing jaw makes it possible to improve the occlusal and functional details, and the more exact measure-ment of the preparation enables an increase in the information content of the image. Furthermore, intra-oral recorded 3-D data sets of gnathic situations often offer new diagnostic possibilities.

The heart of CEREC AC is the Bluecam camera. Instead of infrared light, Bluecam emits short-wave blue light produced by diodes. In addition, the lens configuration is new: aspherical lenses bundle the light beam and orient it parallel to the image sensor (CCD). The light sensitivity has been increased, the image capture time shortened by 50 per cent, and the image sequence accelerated. The projection matrix still employs the tried-and-tested light-stripe grid.

Faster, sharper, blur-free

As a result, the new Bluecam offers higher image accuracy in the critical region where the depth has been increased by 14 per cent. The sharpness of individual images has been heightened, and marginal blurring eliminated. Blur control (auto-matic capture), the sensitivity of which can be pre-selected, checks the intended image, and the camera automatically takes the image only when it is certain that there is no blurring. In quadrants and across the dental arch, any number of pictures can be taken as an overlapping sequence.

The 3-D image catalogue manages the individual images on the screen. The software assesses their usefulness, marks and rejects useless scans, and joins the images to form a complete row of teeth (matching) and a virtual cast modelled on the natural example. Images acquired at the beginning of the sequence, the quality of which may have been lessened owing to the pres-ence of rubber dam or cotton rolls, are automatically exchanged for a suitable image pair as soon as this is found. In this way, inadequate images are quickly replaced. In vitro studies in the laboratory at the University of Zurich in Switzerland have shown that the image accuracy deviates from the reference measurement of a mas-ter laboratory scanner by only 19µm—this is equivalent to one-third of the diameter of a human hair. This means Bluecam's accuracy is similar to that of stationary laser scanners. Such precision in-creases the marginal fitting accu-racy of the restoration; thus, less excess occurs during adhesive luting, which in turn takes less time to remove.

Because of the image depth and focus depth, it is not necessary to keep an exactly determined distance from the preparation: the camera’s prism window can be placed directly on the tooth, which makes intra-oral imaging easier, particularly in the distal region. The Autocapture function, re-sponsible for actually taking the image, engages automatically upon ensuring that the image is in focus. Hence, there is no need to operate a footswitch, which re-quires eye–foot coordination. This means that an entire quadrant can be scanned in 50 seconds. The blur control makes the image sequence and menu operation accu-rate and simple; thus, this phase can be delegated to the dental assistant. The acquisition unit has a wireless or WLAN connection to the milling unit, the system can operate without power with no data loss for up to six minutes, thanks to its own optional, uninterupted power supply—ideal for changing location during the milling/grinding phase.

Up to four-unit bridges chairside

Bluecam takes about 50 sec-onds to scan a complete quadrant and is suitable for scanning stone casts. In addition, bite records with static and dynamic occlusion are digitised and prepared for functional articulation of the restoration. After selecting the bridge tooth databank, the prepara-tion for a four-unit bridge can be scanned with Bluecam. This enables the construction and chairside manufacture of long-term, provisional composite-resin restorations employing the CEREC milling unit, which broadens CEREC's indication spectrum considerably.

As when constructing crowns with CEREC 3D, fissures and cusps of the adjacent teeth are analysed – if desired, the antagonists’ morphology is also analysed – and incorporated into the oc-cusal surface calculation. The software adjusts the occlusal contact points and sliding planes of the crown construction to the occlusal surface of the antagonist. The wall thickness of the projected ceramic framework is checked beforehand, as are the insertion paths of the abutment crowns. After de-signing the restoration, the data set can be transmitted to the total laboratory lacking a CEREC milling unit will in the future be able to access the Internet portal InfinitiDent to have a cast manufac-tured, which will serve as the start-ing point from which the labora-tory itself can manufacture the framework. Thus, CEREC AC and CEREC Connect together offer the smallest possible initiation into the CEREC system, which can be ex-panded upon to any extent desired. Every inlab laboratory can make use of this option to accept work from impression-free practices and manufacture all-ceramic crowns and bridges using CAD/CAM technology.

With the milling unit CEREC MC XL, the new CEREC 3D soft-ware and CEREC Connect, CEREC AC sets a new standard in restorative dental treatment. The system’s ease of operation allows a constant and time-saving work-flow in the dental office. The pro-gressive technology also offers new opportunities for highly effi-cient cooperation with the dental laboratory. In addition, the modu-lar nature of the CEREC system, its consistent development, and its total compatibility with all system components, including the lab-side system inLab, ensure complete treatment flexibility and sus-tainable investment security.

Fig. 1: CEREC Bluecam Intra-oral Scanner. (Image: Götte)

Fig. 2: Quadrant scan with preparations, created from au-tomatically fused individual images to yield a 3-D render-
ing. (Image: Götte)

Fig. 3: Crown restoration: adjusting the counterbite for the dental arch, any number of pic-
tures can be taken as an overlap-
ning sequence. (Image: Sirona)

Fig. 4: CEREC AC showing Bluecam and Quadrant Scan. (Image: Sirona)

Fig. 5: Crown restoration: adjusting the counterbite for occlusal surface design, region 24. (Image: Götte)

Fig. 6: CEREC AC showing Bluecam and Quadrant Scan. (Image: Sirona)

Fig. 7: Crown 4 after adhesive insertion. (Image: Götte)

Fig. 8: CEREC AC showing Bluecam and Quadrant Scan. (Image: Sirona)

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