

Technical Report

Safe Diagnosis with Insight

Modern system solutions help obtain accurate diagnoses

Irrespective of whether you take periodontology, orthodontics, endodontics, implantology or oral surgery – diagnostics always plays a critical part in all fields of dentistry. After all, it is the basis for any treatment and, consequently, decisive as regards the final therapeutic success. Against this background, modern technical aids for completing a diagnostic assessment, especially in the field of imaging, are gaining importance. With their help the prerequisites for obtaining a quick and clear-cut diagnosis can be improved in many different cases. The following report will explain the advantages of state-of-the-art equipment, taking units made by Morita, as an example.

Being able to gain an accurate picture of their patients and the prevailing situation is a basic requirement for dentists and physicians in general before deciding on a treatment. Frequently, aspects that are not visible to the naked eye are of decisive importance. However, it wasn't until the end of the 19th century that the necessary technology was developed and diagnostic radiology was born. Two weeks after Wilhelm Conrad Röntgen published his path-breaking discovery, the dentist Dr. Friedrich Otto Walkhoff already made the first intraoral X-ray, or rather photograph ("shadow image"), on which you can barely make out the shape of the teeth. Since then incredible developments have taken place in the field of dental imaging. Today's solutions feature a markedly lower radiation dose as well as significantly higher scanning speeds – just think, at the time it took 25 minutes to produce a "shadow image"! The most important step forward in diagnostics, however, was the improvement in the quality of the images.

The next generation of diagnostic solutions

State-of-the-art equipment provides outstanding, detailed scan images, and such advanced technologies as cone-beam computed tomography (CBCT) literally take

imaging to another dimension: many different structures are shown in 3D now – a feature that has proven its worth in almost all fields of dentistry. In other words, modern diagnostic systems – such as, for example, Veraview X800 (Morita), which was presented for the first time at this year's International Dental Show (IDS) – can specifically recognize the structures of roots, cysts, tumors and fractures or the density of bones. As a rule, it can be said that the smaller the so-called voxel size that is used for scanning, the higher the diagnostic accuracy. In Veraview X800 (Fig. 1), the required richness in detail is achieved with a very high resolution of more than 2.5 lp/mm MTF 10% and a voxel size of 80 μm . This is unique for a 2D/3D combination system. Besides new features, Veraview X800 can be equipped optionally with a time-proven component that focuses on the relevant area of interest during the imaging: the so-called R100 field of view, within the with the fields of view with a diameter of 100 mm, provides an image scan of the full dental arch by using a convex Reuleaux triangle shape (R = Reuleaux) instead of the typical cylindrical form to scan the area of interest. By adapting to the anatomical shape of the dental arch, the radiated volume and the effective dose are kept as low as possible.

The focus is on minimizing the dose

In addition to the image quality, a decision for or against CBCT in a dental practice will also depend on such factors as costs, space requirement and operation. Above all the FOV and radiation exposure will be relevant for making this decision in connection with dental treatments. Veraview X800, for example, offers the possibility of choosing between up to eleven scanning volumes ranging from \varnothing 40 x 40 mm up to \varnothing 150 x 140 mm (Fig. 2) and, depending on the indication, between a 180° and 360° scanning mode so as to obtain the lowest possible radiation dosage as well as the highest possible resolution and detail. By using this option, the relevant area can be defined precisely, and this, in turn, results in a reduction of the radiation dose. Moreover, the system has new features for panoramic and cephalometric images; e.g. a cephalometric scan can be performed in just 3.5 seconds. With the new functions for panoramic scans, the image layer can be adapted to the dental arch (options: narrow, standard and wide), which greatly improves the image quality in individual cases. Furthermore, the Adaptive Focal Point (AFP, Fig. 3) function analyzes several layers of acquired images, chooses the optimal panoramic layer for each region and then pieces these optimal layers together to form a new image

– in this way, the dentist can see even more details. The Adaptive Gray Scale (AGS, Fig. 4) function, in turn, ensures perfect and balanced contrast.

Ready for the digital practice

Morita offers their own i-Dixel software to round off their diagnostic system solution. It supports complete documentation of the image scans and offers multiple image processing options. With the web-based version i-Dixel Web, your practice will be up-to-date as regards connectivity and mobility: with the help of the data management system, users can view the X-rays directly via the web browser and, consequently, on any device of their choice (e.g. PC, tablet, smartphone). With this tool, dentists can explain the findings, diagnosis, planning and course of treatment in a detailed and understandable way. Furthermore, the tool opens up interesting options to referring dentists with regard to planning dental implants, because by matching the data of 3D images with the data generated by intraoral or model scanners, highly exact 3D plans can be made for the implants and the drilling guide.

Summary

Modern imaging equipment is characterized by high resolution, enormous detail, lower radiation dose and 3D presentation. Depending on the individual patient, these aspects can be of decisive importance for the practice – be it with respect to backward planning in connection with dental implantology, treating cysts and tumors or visualizing a periodontal situation. As the leading manufacturer of X-ray equipment, Morita has developed Veraview X800 and i-Dixel/i-Dixel-Web: a highly functional system solution that unites state-of-the-art hardware and complementary software as well as service options.

Figures



Fig. 1: Veraview X800, which won the iF Design Award, is forging a new dimension in image quality

	Veraview X800 S	Veraview X800 M	Veraview X800 L
Panorama / 3D	Veraview X800 F40 P	Veraview X800 R100 P	Veraview X800 F150 P
Panorama / 3D / Ceph	Veraview X800 F40 CP	Veraview X800 R100 CP	Veraview X800 F150 CP
FOV	2 FOVs: Ø 40 x H 40 mm Ø 40 x H 80 mm	8 FOVs: Ø 40 x H 40 mm bis R 100 x H 80 mm	11 FOVs: Ø 40 x H 40 mm bis Ø 150 x H 140 mm

Fig. 2: The latest generation of Veraview units comprises three models

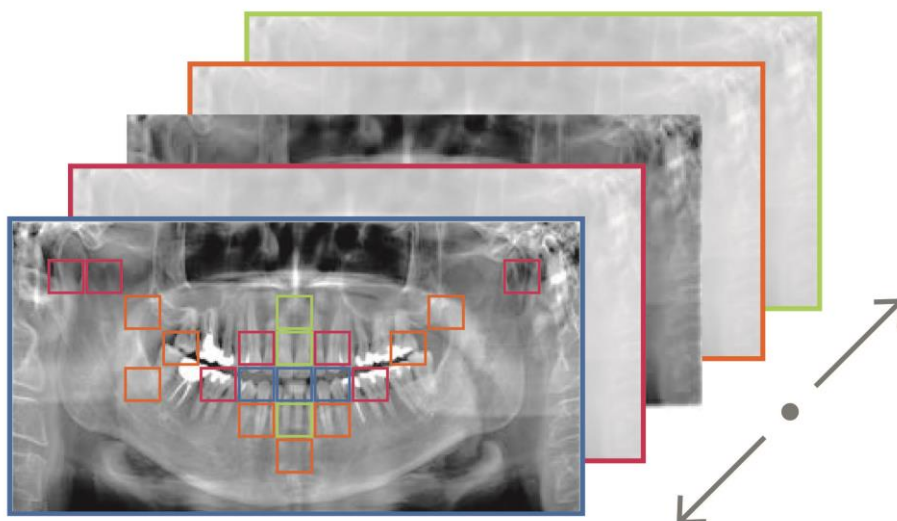


Fig. 3: Adaptive Focal Point (AFP) pieces together optimal panoramic layers to form a new image



AGS OFF

AGS ON

Fig. 4: Adaptive Gray Scale (AGS) ensures optimal contrast throughout the whole image