

# A new level of precision

## Planmeca ProMax 3D takes the guesswork out of pre-surgical planning with Cone Beam Volumetric Tomography (CBVT) technology

By Danny Chan



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The advantages of studying a prospective site in highly detailed, digitally enhanced views that afford measurements of up to 0.01 cm accuracy are just a few reasons why Computed Tomography (CT) is fast becoming a requisite for treatment planning diagnostics. That is the reality of modern dentistry, where the minutest of detail must be analyzed and tweaked on a computer before anything gets done on the patient.

It is no wonder then that more dentists are looking at onsite digital OPG/ CT options, not solely for patient convenience but based on practical, clinically relevant motivations. However, in their quest for an imaging solution, practice owners find themselves agonizing over a host of decisions – upgrade or buy new; 2D or 3D; panoramic or cephalometric; film or digital etc. The answers are really only as complex or simple as the requirements.

Finnish company Planmeca has responded to the barrage of questions with the offering of Promax 3D. Hackneyed as it may sound, the Planmeca ProMax 3D truly qualifies as an all-in-one imaging solution. This multi-purpose X-ray unit offers digital panoramic, cephalometric, 3D CBVT imaging and 3D photo as well as advanced imaging software tools to comply with every possible need in dental radiology.

### Shorter rotation scans for clearer images

Utilizing new Cone Beam Volumetric Tomography (CBVT) technology, Promax 3D is ideal for dedicated imaging of the maxillofacial complex as it uses a pyramid-shaped beam to scan the entire region of interest in a single semi-circle scan, as opposed to a medical CT that takes multiple axial slices in multiple full circle scans.

The volumes are manipulated by computer software into one cylindrical image for viewing. During the scan, each image is generated using a short X-ray pulse instead of continuous radiation. Total scanning time is 18 seconds for one volume, but the actual exposure time is only 3 seconds at shortest. This technology reduces patient radiation dose considerably and forms stroboscopic X-ray effect which, together



with the short rotation scan (only 200 degrees in minimum), virtually eliminates artefacts, contributing to outstanding image quality.

The Planmeca ProMax 3D uses a semiconductor-based flat-panel sensor that is insensitive to electric or magnetic field disturbances. Unlike earlier image intensifiers that use old vacuum tube technology and multi-step focusing, flat-panels use single step image readouts with no geometric distortion, no loss of sensitivity and therefore no need for frequent calibration. The direct deposit CsI on a semiconductor flat panel produces accurate, distortion-free images for 3D reconstruction.

Planmeca's proprietary 3D reconstruction algorithm converts the original 2D transillumination images to a 3D volume study, making it the core component for high quality 3D imaging. Study volume sizes can be selected to meet diagnostic needs without excess radiation outside the area of interest. The basic volumes can also be stitched together to generate a larger view of patient anatomy. Planmeca ProMax 3D produces high-resolution volumetric studies of the mandible and maxilla for analyzing the available bone structure, the location of the mandibular canal, and the correct position for the implant.



### 3D visualization a must for implant cases

For a practice like Melbourne-based Lentini Dental, that focuses on oral, rehabilitation and implant dentistry, 3D visualization is more than just a value-add feature. Since acquiring ProMax 3D last September, practice owner Michael Lentini has been using the X-ray system on all his implant cases and some surgical/ orthodontic cases; as well as those involving impacted teeth near critical sites/ vital structures (e.g. wisdom teeth) near the inferior alveolar nerve.

Dr Lentini states: "It is imperative that implant sites be visualized in 3D. This gives the ultimate in positional visualization for safety and accuracy during surgery. Medico-legally, it should be a must and eventually I believe that some form of C.T will be a minimum requirement.

"For implants, all important structures and bone volume and defects must be viewed before a procedure. It assists in decision making when grafting may be required and if a site is suitable for implant surgery. In the case of impacted teeth, we can check the proximity to the nerve and likelihood of damage in the surgical intervention."

With ProMax 3D, new levels of precision may be achieved in pre-surgical visualization, extending across a multitude of diagnostic requirements. The device is indicated for use in endodontics, periodontics, orthodontics, implantology, as well as dental and maxillofacial surgery and TMJ analysis. It is also an excellent tool for diagnosing ear, maxillary sinus and respiratory tract diseases.

ProMax 3D allows viewing the prospective site in all three imaging planes – sagittal, axial and coronal – and exposes those angles and orientations that were previously elusive to the imaging eye. Three-dimensional studies accompanied by digital cephalometric images provide full visualization of all classes of orthodontic malocclusion. This is highly advantageous for orthodontic planning, as time is saved and patient radiation dose reduced.

Besides assisting in implant treatment planning diagnostics, Dr Lentini believes that "3D has multiple unforeseen benefits in all aspects of diagnosis of pathology".

Giving examples from his own experience, he shares: "Split teeth and endodontic defects can be better localized with 3D. It also allows



better visualization of periodontal defects and the bony profiles to allow better assessment of the long-term prognosis for periodontal patients. 3D is a bonus when treating orthodontic patients with impactions as the exact location of the impacted tooth can be identified."

#### Remarkable real-time 3D views

Inside the Planmeca Romexis 3D Explorer, the 3D image acquisition software for ProMax 3D, users are provided a rendered 3D view that gives a realistic overview of the anatomy. The software incorporates a re-slicing feature, which enhances the projections and enables real-time three-dimensional viewing from the desired angle.

Says Dr Lentini: "The Romexis software has excellent flexibility and is easy to learn. The ability to easily change slice directions with direct mouse clicks on the view selected is remarkable. It gives an infinite range of slice directions to readily view the preferred area. This means that there is no labouring over the computer screen to get to the point, therefore we don't miss an area because of time-intensive or difficult-to-work software. We can see what we want immediately and efficiently and can magnify the view at will."

With the Planmeca Romexis 3D Explorer software, each patient study can be stored on a CD and shared with others using the Planmeca Romexis 3D Viewer. The optional Planmeca Romexis 3D Cross Sections module produces cross-sectional images of anatomy along with the defined panoramic curve. Another optional module called 3D Implant Planning offers tools for implant placing and nerve drawing. On a separate note, Planmeca has recently announced that the Romexis software is now available on the Macintosh platform, which opens up an entire demographic of users in the ever-increasing pool of Mac users.

Following nine months of intensive use, Michael Lentini isn't the only person at Lentini Dental impressed by ProMax 3D.

"The staff now see this as an integral part of our daily practice and a must for all implant cases. Initially, they were stunned at the increased imaging information over the previously used C.Ts and scans loaded on alternative software."

On the system's profitability, he acknowledges: "Currently the fees raised more than covers lease costs, however, the additional pathology requiring corrective procedures that are identified gives the greatest windfall."

Asked what he thinks will become of 3D dental imaging in 2020, Dr Lentini predicts: "Every dental practice serious about complete diagnosis will have one."

In the meantime, he is convinced that ProMax 3D has already helped to raise Lentini Dental's profile as "a serious provider of dental implant solution." ♦