The Best Digital X-ray System is DEXIS! Here’s Evidence to Prove It.
About This Evidence Document

This “Evidence Document” provides a comparison of the imaging technologies using the DEXIS Platinum Sensor with DEXIS Imaging Software (“DEXIS”) and the Schick 33 Sensor with Patterson Imaging Software (“Schick 33”) in internally conducted laboratory bench studies. The performance bench data was generated by using the listed devices and other devices within the boundaries of the cleared indications for use for each of the respective devices. The data was obtained using standard methodologies (phantoms, controlled conditions, etc.) that are accepted in the industry as representative of real world experience that is obtained in larger, heterogeneous and more complex populations, with a broader range of end-users. The intent is that these types of studies and the presented data are useful for identifying less evident but common technological benefits and limitations. The presented data can be recreated using the presented technologies under the same conditions for repeatability and reproducibility purposes.

*Data sources:
DEXIS Sensor Competitive Performance Study, December 2013, by Brad Carlson, Ph.D, and Scott Kravis, Ph.D.

Indications For Use

DEXIS Platinum Sensor
The DEXIS sensor is a USB-driven digital sensor which is intended to acquire dental intra-oral radiography images. The DEXIS sensor shall be operated by healthcare professionals who are educated and competent to perform the acquisition of dental intra-oral radiographs. The DEXIS sensor can be used either in combination with special positioning devices to facilitate positioning and alignment with the x-ray beam or it may also be positioned by hand with the assistance of the patient. Date published: May 28, 2009.

For DEXshield Indications for Use, visit www.dexis.com/ifu.

Schick 33 Sensor
The Schick 33 system is intended for any dental practice that uses X-ray equipment for intraoral diagnostic purposes. It can be used by trained dental professionals for patients receiving intraoral X-ray examinations and produces digital images that can be displayed, enhanced, printed, and saved. Source: Schick 33 System User Guide, April 2, 2013, B1051079 Rev. B, Copyright 2013 by Sirona Dental, Inc.

Contributors

The dental professionals quoted in this document evaluated DEXIS Digital X-ray and provided their views and opinions. They have no financial interest in DEXIS, LLC.

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Schick is a trademark of Sirona Dental GmbH.

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The Evidence is Clear: The Best Image Quality Comes From the DEXIS System.
VISIBLE RESOLUTION & CONTRAST COMPARISON

DEXIS Platinum  
Schick 33

The comparison images above clearly demonstrate that theoretical resolution alone does not equate to actual resolution and best image quality. DEXIS’ “true” resolution of 20+ visible line pairs/mm produces clearer results than the other sensor’s advertised “theoretical” resolution of 33.3 line pairs/mm. These images were acquired at 80ms exposure, 302μGy on a line pair phantom.

Through a combination of proprietary advanced hardware and software technologies, the DEXIS Platinum Sensor excels in visible resolution and contrast.

Radiography is one of the most important diagnostic tools in dentistry. High quality X-ray images reveal subtleties that are crucial to diagnosis, collaboration and patient communication. DEXIS has developed its imaging solutions with that and the clinician in mind.

**PureImage™ Technology** — the science behind the DEXIS sensor and software — delivers the best image quality versus the other sensor. With the DEXIS system you get unparalleled radiographs that are extremely clear, sharp and highly detailed — most importantly, at lower exposure settings.

In addition, **ClearVu™**, DEXIS’ acclaimed image enhancement tool, uses advanced proprietary algorithms to further define the radiograph and reveal details.
The resolution of the X-rays obtained by the DEXIS sensor is so sharp that even when I enlarge an image to my heart’s content to direct the patient’s attention to a certain area, the image doesn’t lose quality.

Cynthia K. Brattesani, DDS, San Francisco CA

DEXIS' PureImage™ Technology

- To bring out small details in the X-ray image, DEXIS’ CMOS (Complementary Metal-Oxide Semiconductor) sensor features an exclusive pixel architecture that effectively uses the active area at the pixel level.
- A premium cesium iodide scintillator converts the X-ray beam into visible light and guides it through its micro-columnar structures. Fiber optics transmit the light precisely to the sensor surface. This efficient design allows a high signal-to-noise ratio resulting in clean images with virtually no visual noise.
- 16,000 Shades of gray are captured by the sensor using a 14-bit analog-to-digital converter. This allows subtle variations in densities to be seen.
- Enhanced quantum efficiency of the CMOS sensor makes it very receptive and efficient when capturing X-ray images across a range of radiation settings, allowing more consistent, usable X-ray images across the exposure range.

IMAGE DETAIL COMPARISON

DEXIS Platinum

Schick 33

With higher visible resolution, higher contrast and lower noise, the DEXIS image makes key anatomy more pronounced and allows better analysis. In the example above, the periodontal ligament is much more visible on the DEXIS Platinum image than on the other image.
**CONTRAST-TO-NOISE RATIO COMPARISON**

A high contrast-to-noise ratio is one of the most important characteristics of a high quality dental X-ray image. It is much easier to see the difference in closely spaced gray values when the contrast-to-noise ratio is higher. Images acquired with the DEXIS system have higher contrast-to-noise ratio which contributes to a clearer, more defined radiograph than that of the other sensor.

![Increasing Contrast to Noise](image)

This illustration shows how more noise results in loss of visible detail and contrast. The gray values of the inner and outer squares in the examples above are slightly different. The inner box becomes more defined and clearly visible as the contrast-to-noise ratio increases.

![Graph](image)

The graph shows the actual contrast/noise comparison of DEXIS images vs. those of the other sensor at varying doses.

**HISTOGRAM COMPARISON**

**DEXIS Platinum**

The histograms were realized by placing an aluminum step wedge on the sensor and plotting the number of each gray value spanning a region of interest across the wedge at various doses. The resultant data represents three aspects: noise, contrast, and image usability at a high and low dose range. Each peak represents the value at a particular step. The narrower the peak, the less noise in the image. The greater the space between the peaks, the greater the contrast and the greater the ability to distinguish between closely spaced gray values. When peaks merge, it means you can no longer distinguish between the two steps as the values of the gray appear the same. Peaks clumped to the left means too much white; to the right, too much black. Each X-ray illustrates how an image might appear using the same exposure settings as the histogram depicted closest to it.

**Schick 33**
The Evidence is Clear: DEXIS Delivers More Consistent Images at Lower Doses.
DEXIS radiographs are more consistent and clinically useable at a wider range of exposure settings than those of the other sensor. Practitioners benefit from a reduction in the number of time consuming, exposure-related retakes. Patients benefit from the reduction in radiation.

**IMAGE COMPARISON AT A LOW DOSE**

These images, excerpted from the chart above, were taken at a very low dose at 0.032 seconds. Even in non-ideal exposure conditions, DEXIS produces an image that is more clinically useable.
DYNAMIC RANGE

Dynamic range refers to the broad range of exposures at which diagnostically acceptable dental images are produced.

Even in the most prudent dental practices, minor positioning and setting issues may not be apparent at the start of an X-ray procedure. The DEXIS system is forgiving even when radiographic conditions are not ideal. DEXIS hardware and software work in harmony to compensate for radiation variances thus helping guard against under and over exposure.

DEXIS’ quantum efficiency is a factor in outperforming the Schick 33 sensor at a wider dynamic range, and most importantly, at lower doses. More strict conditions must be met to achieve a diagnostically usable image with the other sensor.

The result of a broader dynamic range is that practitioners benefit from a reduction in the number of time consuming, exposure related retakes and patients benefit from the reduction in radiation due to exposure issues.

“I can’t remember the last time I had to retake a DEXIS X-ray because of image quality. It just doesn’t happen.”

Fred H. Peck, DDS, AAACD, Cincinnati OH

“If we can decrease patients’ radiation exposure without sacrificing image clarity or detail, then we should definitely do that for them.”

Cynthia K. Brattesani, DDS, San Francisco CA

SIGNAL VS. EXPOSURE TIME (µGY) COMPARISON

The straighter the line, the better. In the graphs below, a line curving and becoming flat is an indication of loss of contrast which results in a blackened image with no discernible detail.

DEXIS Platinum

Schick 33

Data was realized by using an aluminum step wedge on the sensor. Each step has a different thickness. Each plot represents one step vs. dose. What this data shows is that at higher doses, the DEXIS sensor performs better with varying opacities of teeth. The Schick 33 sensor at higher doses would have less discernable gray values which could potentially affect the ability to see interproximal decay.
DEXIS EXCLUSIVE — RADIATION REDUCTION DEVICE

DEXshield™ is a unique dental positioning ring and a patented patient protective shield. When used during the dental radiographic procedure, it aligns the X-ray beam with the examination site and provides an attenuating barrier to protect the patient from unnecessary radiation exposure.

In a laboratory setting, DEXshield plus the DEXIS Platinum Sensor was determined to reduce absorbed dose by at least 30% as compared to the Universal Ring plus the DEXIS Platinum Sensor. DEXshield is for use with the DEXIS Platinum Sensor exclusively.
The Evidence is Clear: 9 Out of 10 People Prefer the Comfort of DEXIS.
The unique, ergonomic shape of the DEXIS Platinum sensor fits more comfortably in patients’ mouths and against the anatomy. Clinicians can move about the mouth efficiently which can mean a more accurate procedure and less retakes due to patient movement.

88% Prefer the comfort of the DEXIS sensor.

Thin doesn’t win the comfort competition.

“When I can make my patients comfortable, it creates a better experience for them and less stress for me. Using the DEXIS sensor provides me with a way to capture great images while maintaining a high level of comfort which, in turn, lets me finish a radiographic procedure quickly.”

Shelly Rice, RDH, Lake Elmo MN
DEXIS Platinum and the other sensor went head-to-head in a double-blind, randomized, controlled trial that involved people with varying anatomy including small to large mouths, shallow palate, tori, narrow arches and patients with a strong gag reflex. Eighty-eight percent of the participants found DEXIS to be the most comfortable sensor.

<table>
<thead>
<tr>
<th>DEXIS Platinum</th>
<th>Schick 33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-zero-radius design (no flat surfaces or sharp edges) with a smooth rounded casing.</td>
<td>Flat front and back surfaces; edges can feel pointy to the touch.</td>
</tr>
<tr>
<td>PerfectSize™ 39 x 29 mm; single sensor solution allows faster procedure.</td>
<td>Size 2 shown: 43 x 30 mm; switching between multiple sized sensors takes additional time.</td>
</tr>
<tr>
<td>Beveled corners fit better in the cavity and allow more comfortable placement against palate and soft tissue.</td>
<td>Some people found the squared housing to be uncomfortable and caused discomfort when a sensor corner is placed against the palate.</td>
</tr>
<tr>
<td>Small, angled dome and patented 32.5° WiseAngle™ Cable Exit helps patients better tolerate the procedure and makes precise placement in posterior regions easy.</td>
<td>Traditional 0° cable exit adds bulkiness, may cause discomfort when the cable is bent in a patient’s mouth, and may make precise placement more difficult.</td>
</tr>
<tr>
<td>Cable thickness: 2.9 mm</td>
<td>Cable thickness: 3.2 mm</td>
</tr>
</tbody>
</table>
**DEXIS’ TrueComfort™ Design**

In addition to the comfort benefits it provides to patients, the Platinum sensor’s TrueComfort™ design also benefits clinicians with its excellent performance and ease of use. You are able to more efficiently move about the mouth with the DEXIS sensor, even in tough areas such as upper molars and lower premolars. In fact, a full mouth series of X-rays can be completed in only 5 minutes due in part to sensor’s thoughtful design.

**DEXIS’ Exclusive Custom Holders**

DEXIS’ form-fitting holders are made from durable, medical grade plastic and hug the Platinum sensor, preserving its shape. They are custom engineered to snap on easily and provide a firm hold without adding extra bulk. The holders support the paralleling technique and keep the sensor properly positioned.

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**PATIENT COMFORT COMPARISON**

**DEXIS Platinum**

**Schick 33**

Patient comfort during the procedure has impact on the quality of X-ray images. With DEXIS, fewer retakes are necessary due to patient movement partly because the ergonomic format of the sensor is more comfortable than square-cornered formats like the other sensor. A more comfortable sensor can give you better images on the first take, beneficial for both expeditious workflow and less radiation exposure for the patient. In the images above, the patient, who has a small mouth, was unable to close completely and expressed discomfort with the Schick 33 sensor, and lower quality images were the result. The DEXIS sensor was more comfortable for the patient who was able to use the bite block properly and fully close, which resulted in a better image.
The Evidence is Clear: DEXIS’ Ease of Use and Faster Workflow Saves Valuable Time.
Combine DEXIS’ sensor design (size, shape, technology) and snap-on custom holders with its highly automated, user-friendly software interface and you get the easy-to-use digital X-ray system that offers the faster workflow versus the other sensor — up to 3.3 times faster.

<table>
<thead>
<tr>
<th>FMX Order</th>
<th>DEXIS Platinum</th>
<th>Schick 33</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Posteriors</td>
<td>PerfectSize Sensor + 1 Set Holders</td>
<td>Size 2 Sensor + Size 2 Holders</td>
</tr>
<tr>
<td>6 Anteriors</td>
<td></td>
<td>Switch to Size 1 + Size 1 Holders</td>
</tr>
<tr>
<td>4 Bitewings</td>
<td></td>
<td>Switch to Size 2 + Size 2 Holders</td>
</tr>
</tbody>
</table>

Time

![Image showing comparison of Time to Complete Digital Full Mouth Series (FMX) with DEXIS and Schick 33 systems.](www.dexis.com/fmxin5)

“The software functions are so automated and X-ray positions are efficiently grouped together for fewest sensor moves and holder changes. And the sensor is rounded and comfortable for the patient, and an FMX can be completed in 5 or 6 minutes.”

Carolyn Potthoff, RDH, Grosse Pointe Woods, MI
The DEXIS system is easy to learn and simple to use. For example, when the sensor detects radiation, the image is automatically captured, saved, dated, tooth numbered, correctly oriented and mounted — all without the need to return to the keyboard. In addition, the software can recognize multiple sensors used at a single workstation; and using DEXIS requires fewer accessories and mouse clicks than the other sensor. Clinicians can save time better spent on other things. Efficiency benefits patients too. It contributes to a quicker, more comfortable procedure and less time in the chair.

### EASE OF USE COMPARISON

<table>
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<tr>
<td>Takes vertical and horizontal bitewings and all periapicals with a single <strong>PerfectSize™</strong> sensor. With 1 sensor and its 1 set of companion accessories the X-ray procedure is faster.</td>
<td>Must switch between multiple sensor sizes and multiple associated accessories. Need time to identify best sensor to be used depending on patient and seek out size-specific holders.</td>
</tr>
<tr>
<td>Image capture and processing electronics are fully integrated into the sensor itself allowing direct, reliable USB connectivity.</td>
<td>Requires multiple components including a separate docking station.</td>
</tr>
<tr>
<td>Patented sensor design and snap on holders eases use and positioning. Small angled dome and angled cable exit on the sensor's back makes precise placement in posterior regions easy.</td>
<td>Rectangular shape and traditional 0 degree cable exit requires more time to position the sensor. The use of sticky tabs to adhere sensor to holder adds a step.</td>
</tr>
<tr>
<td>‘Open-flow’ workspace arranges images intuitively, based on their anatomical location, and it’s easy to compare images.</td>
<td>Uses fixed, pre-determined templates. Cannot rearrange images outside of a template. Takes more time to arrange images and compare them.</td>
</tr>
<tr>
<td>Single-screen, button-based graphical user interface is easy to navigate and takes advantage of hot key shortcuts.</td>
<td>Less intuitive due to the need to navigate through two levels of drop-down menus and use the standard keys to perform functions.</td>
</tr>
</tbody>
</table>
| Common tasks done in 2 clicks or less including an endo procedure and bitewing and full mouth series. In 1 click, view all images for patient: intra- and extra-oral X-rays (pans, 3D) and intra- and extra-oral photos (IU camera, digital camera, scans). Sharpen = 1 click. | Bitewing series = 3 clicks. 
Full mouth series = 3 clicks. 
Endo procedure = 3 clicks. 
View multiple types of images = 3 clicks. 
Sharpen = 2 clicks. |
| Hover cursor over any icon or button to reveal a Tooltip with info about its function. Feature is available throughout the DEXIS software. | Must access and navigate the Help Menu. |
COMPONENTS COMPARISON

DEXIS Platinum
Simply “plug-n-ray.”

Schick 33
Choose, locate, connect.

Image Source: Schick 33 webpage, guide.

DEXIS EXCLUSIVE — MODERN PATIENT COMMUNICATION

DEXIS go™ is a sleek, engaging way for dental professionals to communicate with their patients using an iPad.

This companion app to the DEXIS software was designed to provide a great visual patient experience around image presentation in support of clinical findings and treatment recommendations. All images – radiographic and camera – in the patient record can be viewed on the iPad. No other digital X-ray system offers this type of functionality.

Line Up Your Hands-On Demo!

You’ve seen the evidence — now witness the DEXIS difference in person! Call 1-888-883-3947 or visit dexis.com/demo to schedule your in-practice, hands-on examination of the best digital X-ray system.