

A Brief Overview of Digital Radiography Systems

Are you currently using film? Are you curious about digital radiography and want to know more? This helpful information is just for you.

Think for a moment of the contribution radiography makes to your practice. Consider the value of radiographs in diagnosis, treatment and patient education. Now, Imagine. What if everything could be made better, faster, easier? It can be. Digital radiography is the answer for thousands of dentists who have upgraded to digital systems and are enjoying the significant benefits. Patients and staff experience the tremendous advantages of digital radiography over conventional wet film processing. Digital radiography delivers diagnostic, archiving and cost control capabilities absolutely unobtainable using film. The central question is no longer "Should I?", but "How do I?".

This article will help you visualize the benefits of digital radiography, understand the characteristics of the two major types of systems and gain basic knowledge that will assist you in configuring a system for your practice.

What advantages does digital radiography offer the Dentist?

People are visual. Digital radiography is a powerful visual tool. All digital systems present the radiographic image on a monitor. The image is larger, brighter and sharper; easier for you and your patient to see. Image characteristics, like brightness, contrast, sharpness and magnification are all adjustable to suit your preferences, creating a powerful presentation and diagnostic aid. A well-educated patient more readily accepts treatment and is better equipped to enhance their oral health. Digital radiography allows the patient, guided by the Dentist, to visualize options and outcomes. Imagine simplified diagnosis from a clear, sharp, monitor-size image rather than a square-inch size piece of film.

Digital radiography builds your practice by improving productivity. Every step in the imaging process requires less time and produces results far superior to film. Every cleaning and maintenance task (and the cost) associated with film processing is eliminated. This productivity benefit is often dismissed. Remember: the most successful practice and the least successful practice both start every day equally; each is given the same amount of time. Digital radiography delivers real, measurable productivity gains.

Attract talented members to your team using the non-financial incentive of digital radiography. People want to work with modern equipment and treat patients using contemporary modalities that are effective and productive.

The speed, ease of use and freedom from maintenance enable all members of the dental team to focus more on patient care. Total imaging expenses are better managed because the significant costs of film processing and maintenance labor are eliminated.

Two Types of Digital Systems

There are two distinct technologies. The first, sensor systems, are "Direct", meaning that the receptor sends the data directly to a computer via wires or wireless transmission. The second type of digital system is "Indirect". With these, the receptor is inserted into a reader or scanning device that sends the data to the computer. Indirect systems create images using Phosphor Storage Plates (PSP). Both sensor and PSP systems are used in thousands of dental practices. There are differences in design, operation and performance. The key to your success with digital radiography is to choose the products that work best for you, under your actual conditions.

Sensors

There are two types of sensor architecture, CCD (Charge-Coupled Device) and CMOS (Complementary Metal Oxide Semiconductor). There is considerable ongoing debate regarding the respective merits of the competing technologies. Many experts believe that for an exacting imaging application such as medical and dental radiography, the CCD sensor is the best choice because it produces the most detail-rich, lowest noise image. However, CCD sensors sometimes have a higher initial investment than CMOS products. The data captured by the sensor is transmitted to the computer via Wired USB, Ethernet, Wireless RF and Bluetooth. The newest technology used for transmitting data is Bluetooth, which is already widely used in mobile communication devices.

Sensors offer a singular advantage: speed. From exposure to image presentation on the monitor takes only a few seconds. Sensors are commonly used during Endodontic procedures or for trauma cases where speed is imperative. Sensor images are created chairside. There is no need to leave the operatory for processing.

Sensors present their users with some limitations. First, they are available in a limited size range, usually sizes 0, 1 and 2. If you require other film sizes, like 3 and 4, you face a compromise as these sizes are not available. Second, sensors cost several thousand dollars each. The average cost of a size 2 sensor today is \$7,000.00. Third, they require a longer learning period. Because sensors are rigid

and much thicker than film, new positioning techniques will need to be learned. It may take a while to develop proficiency. Since every patient is unique, not everyone will tolerate the thickness and rigidity of a sensor, particularly children and those with small mouths. Finally, do you own or plan to purchase a Panoramic or Cephalometric X-ray unit? If you want to convert to digital radiography using sensors you have two choices. You will need to either buy a direct digital extraoral X-ray, which can cost well in excess of \$35,000 or have a digital conversion to your present extraoral machine if that option exists. The alternative to both is an indirect system.

Phosphor Storage Plate Systems

PSP or Phosphor Storage Plate systems are “Indirect”. The X-ray image is captured using a PSP. PSPs are wireless. Since they are not directly connected to the computer, a device is required to read or extract the data from the PSP and send the image data to a computer.

PSPs have several important characteristics. They are available in all film-equivalent sizes: 0, 1, 2, 3 and 4 plus Panoramic and Cephalometric. A PSP is flexible and actually thinner than a piece of dental film so it can be easily positioned in the mouth using the same techniques and holders that are currently used for film. PSPs have a long service life, typically in the range of 1,000 exposures. When compared to sensors, plates are very affordable; a typical size 2 PSP costs about \$25.

There are several indirect or PSP systems available. Some process only intraoral sizes, others process both intraoral and extraoral sizes. Some systems will accept only a single PSP at a time; others accept multiple plates and sizes at the same time. Finally some products require that the PSP be placed in a holder or carousel before insertion into the scanner; others are direct-feed, where the PSP is placed into the scanner with no additional devices needed.

If you own a film based Panoramic or Cephalometric X-ray it is easy to upgrade to digital with the appropriate PSP system. Just replace the film with the correct size PSP and remove the intensifying screen from the film cassette if one is present. Expose as with film and place the PSP in the scanner to be read. Your extraoral X-ray is now converted to digital; there is no need to buy new equipment. Most indirect digital radiography systems are designed to be placed in a central area so that staff can easily access the system. The images can then be networked throughout the practice.

What System is Right for you?

The step up to digital radiography can be fun, exciting and very rewarding. Partner with your full service dealer. Your dealer knows you, your practice and your work habits. Their insights and counsel can be invaluable. You will want the support that is always needed when making an important change. Plan for the change, consult with

your local authorized Air Techniques Dealer and choose the system and software that meet your needs best. You may also want to consider a hybrid system because they are gaining in popularity. Hybrid systems, using both sensors and PSPs offer the most comprehensive approach to digital radiography.

Here are some questions you should answer when evaluating a digital radiography system for your practice:

1. Is your computer system ready for the demands of digital imaging?
2. Is the manufacturer you are choosing one you can trust?
3. Will you image intraorally, extraorally or both?
4. Can the system be used with your present extraoral X-Ray equipment?
5. Will the system enable you to image using all film-equivalent sizes?
6. Will the system work in normal room lighting?
7. Does the system offer multiple resolution settings?
8. Is the product demonstrably easy to use?
9. Are images created quickly?
10. Will the product work with many brands of software?
11. Does the system fit the way you work?

Every day, Digital Radiography systems help more Dentists achieve superior imaging results. Explore the possibilities and enjoy the benefits.

