

Digital Imaging: A Work Multiplier

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The value of digital imaging in the modern dental office is well known. Digital radiography is a *work multiplier*; that is, this technology replaces human effort, making tasks the practitioner and staff members perform easier, more error free, and in some cases, making new tasks possible.¹ Digital radiography provides clear benefits when comparing the total cost of acquisition and use to the labor savings and quality of services rendered.

Two methods of producing primary digital images are available: direct solid-state detectors (ie, CCD/CMOS detectors)² and indirect photostimulable phosphor plates. What are the advantages of solid-state digital radiography and phosphor plates over silver halide film? A few of the most important benefits include a reduction in radiation required to produce an image with most direct detectors, environmental waste reduction, elimination of darkroom costs, improved work flow, electronic image processing (EIP), feature extraction (ie, ability to detect features from large data sets) (Figure 1), electronic image transfer (Figure 2), increased security (Figure 3), and the appearance of a high tech practice.

A simple way to compare the benefits of digital radiography to film is to evaluate the “imaging chain.” *The quality of an image depends on each step of the process, and the weakest link degrades the final result.* Digital radiographic and film-based imaging both require a subject and x-ray generator. But here is where the similarity ends. The film-based system requires fresh film that has not been overheated during shipping or transported in proximity to a radiation source. Then the film has to be developed in chemicals that are mixed and regulated with regard to temperature and freshness. Any light leaks in the darkroom or daylight loader will affect the image quality. Then there are the issues of the misplaced film, film duplication for insurance requirements – the list goes on and on.

Once the image is developed and the film is mounted, the clinician can evaluate for retakes. This ties up the operator and staff for additional time. Digital imaging, on the other hand, requires a sensor or photostimulable phosphor plate and a computer. There are virtually no variables except the positioning of the sensor or plate and the exposure setting on the x-ray generator. Once the detector has been exposed, a quick decision can be made about the adequacy of the image, and retakes can be accomplished in a matter of seconds. Although digital radiography has many advantages over film-based imaging, there is a learning curve, and training is imperative. Other considerations in the return on investment (ROI) analysis are the costs of maintaining the computer system and maintenance agreements.

When digital radiography systems are analyzed from the human perspective, they allow the clinician and staff to produce images that take less time to expose, retake, and transmit. When additional benefits like EIP, feature extraction capabilities, and the ROI of digital imaging are compared to film-based radiography, the clear winner is the digital option, along with the clinician, his or her staff, and the patient. ■

REFERENCES

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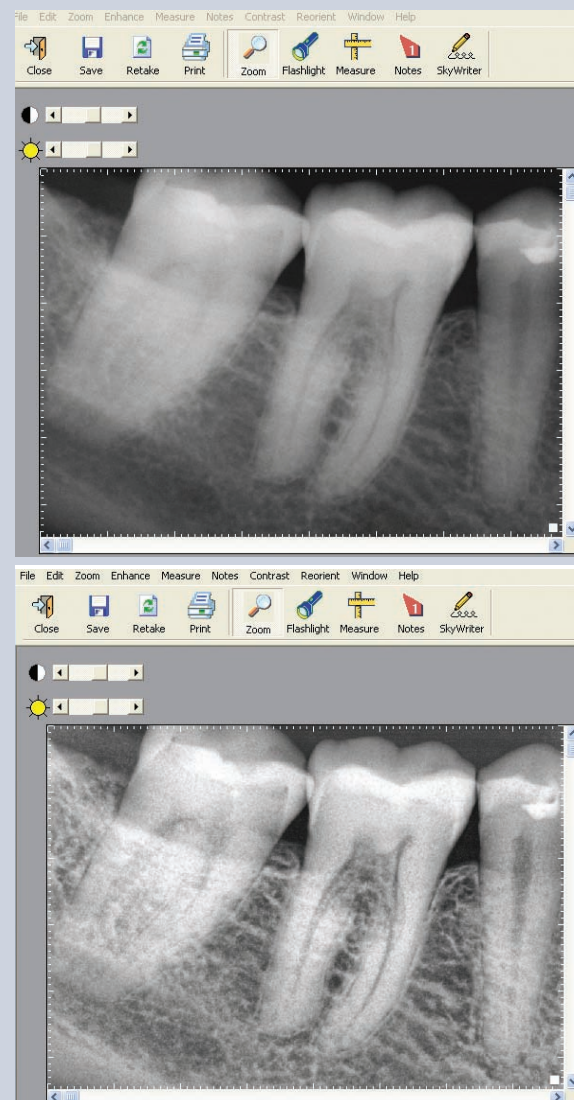


Figure 1. Digital image processing can improve the visibility of image features and is one of the primary benefits of computer-aided radiography (eg, top image not enhanced, bottom image enhanced with contrast tool; Courtesy Schick Technologies, Inc.).

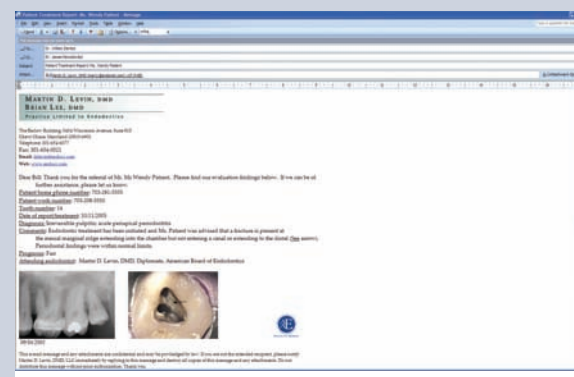


Figure 2. Transmitting a patient's endodontic treatment report by email relies on digital radiographic and photographic imaging to speed the process of communicating between therapists.



Figure 3. The security of digital images can be ensured by backing up data on the Internet, tape, or hard drives for off site storage. This tape can backup 80 GB and can be stored offsite for added security.