



**Dentaquip**

# Digital Imaging in Dental Radiography


A look at the advantages and disadvantages of using the latest imaging processing techniques in the Dental Environment by **Dr Simon Shawe — Digital & X-Ray Specialist at Dentaquip**

## Digital Imaging versus conventional (Analogue) Imaging in Radiography

X-Ray imaging technology in dentistry today falls into two broad categories - Analogue and Digital. Both of the technologies can be used with intra-oral and extra-oral dental X-Ray machines.

### Analogue Image Processing

Analogue processing is the traditional film processing technique which uses silver-halide X-Ray films, processed after exposure by dipping into chemical developer and fixer solutions, followed by rinsing and drying. This can be done manually in a conventional type dark room using tanks or, more commonly nowadays, by being fed through an automated processor which ensures correct operating temperatures and processing times as the film is moved through the processing stages. This process typically takes about 5-6 minutes start to finish.

Advantages	Disadvantages
<p><i>Lower entry cost for equipment (X-Ray film processor + fitting).</i></p> <p><i>Large percentage of trained users in dental population.</i></p> <p><i>Equipment already used by many existing practices.</i></p> 	<p><i>Running costs – materials (processing chemicals &amp; films) .</i></p> <p><i>Used chemical disposal</i></p> <p><i>Processing chemicals can be dirty and smelly in a surgery, and are toxic to the environment.</i></p> <p><i>Length of time taken to process films.</i></p> <p><i>Requires (relatively) high radiation dosage compared to digital alternatives.</i></p> <p><i>Space required for storing and indexing films.</i></p> <p><i>Little or no 'film backup' solution (original films can be mislaid).</i></p> <p><i>WYSIWYG – What you see is what you get. Without expensive and time consuming film enlargement capabilities, diagnosis is limited to the size and exposure/development characteristics of the original film.</i></p> <p><i>Potential degradation of image with time (especially if developer/fixer balance not exactly right).</i></p> <p><i>Images not easily shared (geographically).</i></p>

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## Digital Image Processing

Computerised (digital) images can be obtained by scanning an existing X-ray film (much like scanning negatives or documents on your scanner at home), by using a phosphorus imaging plate system (Indirect Digital imaging method), or by using a digital sensor (Direct Digital imaging method) to capture the images almost instantaneously, much like a digital camera does when it is connected directly to your PC.

### Indirect Digital Imaging

Phosphor imaging plates are flexible, and are similar in look and feel to conventional film, and are also positioned in the patient's mouth just like conventional film. By a process of scanning into a computer using laser technology, these plates can be used to enable existing intra-oral and extra-oral machines to produce digital images in place of film and the associated chemical based processing overhead which that requires. The plates are reusable, have a much broader X-Ray sensitivity spectrum from high sensitivity (using low dosage) to low sensitivity (high dosage), and provide good quality images right across this spectrum. They are also less sensitive to direct light than X-ray films, making them a little easier to work with in the dental environment. Laser processing takes about 20 seconds for a typical intra-oral image, and about 90 seconds or so for a panoramic image. Finally, the plates can be 'refreshed' by exposing them to light for a short period of time.

Advantages	Disadvantages
<p><i>Lower radiation exposure for patient (can be as much as 90% reduction*)</i></p> <p><i>Lower running cost - no consumable films or chemicals required.</i></p> <p><i>Simplification of processing task with improved productivity**.</i></p> <p><i>Phosphor plates are at least as flexible as film, improve patient comfort and offer ease of use.</i></p> <p><i>Can effectively digitise existing Intra Oral and OPG machines at economic cost, particularly for multi-surgery setups.</i></p> <p><i>Powerful capability to enhance, enlarge, manipulate and share X-Ray images via PC and networks leading to more efficient diagnosis capability.</i></p> <p><i>Ability to easily &amp; quickly share X-Ray images with geographically separated sites.</i></p> <p><i>Ability to duplicate, backup and archive X-Ray images easily.</i></p> <p><i>No degradation of image with time.</i></p> <p><i>Simplified image filing of the X-Ray examinations.</i></p> <p><i>Easier, more effective communication with patients</i></p> <p><i>Added value for practice</i></p>	<p><i>Still requires some (dry) processing.</i></p> <p><i>Higher entry cost for equipment (scanner and PC required as well as range of phosphor plates).</i></p> <p><i>Although reusable, phosphor plates will need to be replaced eventually.</i></p> <p><i>Requires some basic computer skills to operate.</i></p> <div></div>

\* Ref: 'Increase profits by digitising your practice' article by Edwin Bonner BDS Mdent which appeared in 'Dental Practice' journal volume 42 No. 11, November 2004.

\*\* Some indirect scanner systems e.g. Denoptix have simplified "Load 'n' Leave" process capability allowing images to be acquired without an attendant waiting for individual phosphor plates to be processed by the machine.

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## **Direct Digital Imaging**

Digital sensors produce high quality computerised images in real-time. As such, they are extremely useful for e.g. endodontics, where many exposures are needed rapidly as images can be captured very quickly at very low radiation dosages using sensors. The technology behind the sensor is CCD (Charge Coupled Device) and CMOS (Complementary Metal Oxide Semiconductor!) based - quite similar to the technology used in your video or digital camera. Digital sensors can sometimes be a costly solution, especially for multi-surgery practices, but they do make the most efficient use of technology to capture digital X-Ray images.

Advantages	Disadvantages
<p><i>Lower radiation exposure for patient (can be as much as 90% reduction*)</i></p> <p><i>Lower running cost - no films or chemicals required (nor film processor and dark room).</i></p> <p><i>Simplification of task and much improved productivity (large time saving)- no 'physical' film processing required</i></p> <p><i>Powerful capability to enhance, enlarge, manipulate and share X-Ray images via PC and networks leading to more efficient diagnosis capability.</i></p> <p><i>Almost instant in-chair diagnosis possible.</i></p> <p><i>Ability to easily &amp; quickly share X-Ray images with geographically separated sites.</i></p> <p><i>Ability to duplicate, backup and archive X-Ray images easily.</i></p> <p><i>No degradation of image with time.</i></p> <p><i>Simplified image filing of the X-Ray examinations.</i></p> <p><i>Easier, more effective communication with patients</i></p> <p><i>Added value for practice</i></p>	<p><i>Sensors can be bulky and inflexible compared to conventional film or phosphor plates.</i></p> <p><i>Higher entry cost for equipment (sensor and PC required).</i></p> <p><i>Requires some basic computer skills to operate.</i></p> <p><i>A little more skill required for optimal sensor placement.</i></p> <p><i>May need additional capability (e.g. self developing X-Ray film) for occasional patients who are unable to tolerate sensor.</i></p> <div> </div>

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If you would like to know how a digital imaging solution can help you in your practice, then we will review your existing practice setup, and recommend integrated solutions to take advantage of the best digital technology that is available in the marketplace today.

**[Call Simon now on 07739892346](tel:07739892346)**

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