

# DIGITAL IMAGING: WHAT ARE YOUR OPTIONS?

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## PART 4: Flat Panel DR

In Part 3 of this series, we discussed the advantages and disadvantages of CCD based systems (“CCD DR”). Part 4 will focus on Flat Panel based DR (“Panel DR”) as an imaging modality for digital imaging.

In the medical imaging industry, there are several definitions used for the various modes of digital imaging. For this series, CR was used to describe digital imaging achieved by the use of photostimuable plates used in a cassette. The term DR will be used to describe digital imaging in which the image receptor is non cassette based. This may be DR that is either CCD based (“CCD DR”) as discussed in Part 3 or Flat Panel based (Panel DR). In either of these systems, the x-ray exposure is made directly to the image receptor and it is not necessary for the technologists to handle an imaging plate or cassette.

Flat Panel based DR systems utilize a flat panel detector system that either through a direct or indirect process, convert the incident x-ray photons to an electrical charge. This electrical charge is then converted to a digital signal and processed by a computer. Flat panel detectors that are Amorphous Silicon based utilize the indirect process in which x-ray photons are first converted to light signals and the light signals are converted to a digital signal. Amorphous Selenium systems convert the x-ray photons directly to an electrical charge which is then converted to a digital signal. This is a much simplified description of the process. The details of this conversion process are beyond the scope of this article.

Like CR systems, Flat Panel DR imaging offers many advantages when compared to conventional analog film-screen radiography. They may also offer advantages when compared to CR systems or CCD DR systems. These benefits include but are not limited to:

- 1. Improved Efficiency:** Since imaging plates/cassettes are not utilized with Flat Panel DR systems, workflow efficiency is improved. This may be particularly useful in high volume situations.
- 2. Image Display:** Typically, images are displayed in 4-10 seconds and the unit is ready for the next image. This compares to a 45 to 85 second cycle for image display and subsequent erasure of the image plate for CR. Typically, the detectors are refreshed and ready for the next exposure in a matter of seconds
- 3. Image Quality:** Images are usually significantly better compared to CCD DR systems. This is due to the higher DQE (Detector Quantum Efficiency) exhibited by Flat Panel Detectors.

Flat Panel DR systems also have some disadvantages when compared to CR imaging:

1. **Utilize Existing Equipment:** Although some Flat Panel based receptors may be retrofit into existing equipment, this is not true in all cases. Care must be taken if attempting to retrofit a Flat Panel based system with existing equipment to assure a successful transition.
2. **Positioning Flexibility:** In general, Flat Panel based systems are fixed position and do not allow for cross table or table top exposures. There are advances in technology that are addressing this issue, such as the use of “wireless transmitters” to transmit data from the imaging plate to the workstation
3. **Cost:** In general, Flat Panel DR systems are significantly more expensive than either CR systems or CCD based DR systems.
4. **Detector Replacement:** In most instances, a damaged or faulty Flat Panel cannot be repaired. They must be replaced. Replacement cost and/or insurance to cover a damaged detector plate is usually an expensive proposition.

**Summary:** Flat Panel based DR systems are a desirable option for those wishing to transition from analog to digital radiography and speed of image acquisition is of major concern and there is little budgetary constraint.