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Editorial

Digital radiography in the field of medical sciences

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Digital radiography is a form of radiography that uses x- ray–sensitive plates to directly capture data during the patient examination, immediately transferring it to a computer system without the use of an intermediate cassette. Instead of X-ray film , digital radiography uses a digital image capture device. This gives advantages of immediate image preview and availability; elimination of costly film processing steps; a wider dynamic range, which makes it more forgiving for over- and under-exposure; as well because the ability to use special image processing techniques that enhance overall display quality of the image. Advantages include time efficiency through bypassing chemical processing and therefore the ability to digitally transfer and enhance images. Also, less radiation are often wont to produce a picture of comparable contrast to standard radiography.

Compared to other imaging devices, flat panel detectors, also referred to as digital detector arrays (DDAs) provide top quality digital images. They can have better signal-to-noise and improved dynamic range, which, in turn, provides high sensitivity for radiographic applications.

Flat panel detectors work on two different approaches, namely, indirect conversion and direct conversion. Indirect conversion flat panel detectors have a scintillator layer which converts x-ray photons to photons of light and utilise a photograph diode matrix of amorphous silicon to subsequently convert the light photons into an electrical charge. This charge is proportional to the quantity and energy of x-ray photons interacting with the detector pixel and thus the amount and density of fabric that has absorbed the x-rays.

Direct conversion flat panel detectors use a photograph conductor like amorphous selenium (a-Se) or Cadmium telluride (Cd-Te) on a multi-micro electrode plate, providing the best sharpness and determination . The information on both sorts of detectors is read by thin film transistors.

In the direct conversion process, when x-ray photons impact over the photo conductor, like amorphous Selenium, they're directly converted to electronic signals which are amplified and digitised. As there's no scintillator, lateral spread of sunshine photons is absent here, ensuring a sharper image. This differentiates it from indirect construction.

When a flat panel detector is including an appropriate manipulator and image processing software, they will be used for x-ray computerized tomography (CT) inspection, producing a 3D image of the external and internal structure of the test object.

Another sort of digital x-ray detection media are linear detector arrays (LDAs). These contains one row of x-ray detection pixels, instead of a matrix. The LDA or the thing under inspection got to move relative to every other to formulate a 2D radiographic image. LDAs are suited to inspection of objects moving on a conveyer belt.

Digital Radiography Applications

- Aerospace product examination
- Detection of Corrosion Under Insulation (CUI) in petrochemical, oil and gas and power generation industries
- Detection of Flow accelerated corrosion
- Foreign object detection
- Casting and weld inspection
- Inspection of composites and fibre reinforced components
- Product and process development