

IMAGING TECHNOLOGY FOR FAST CONTROL AND SORTING APPLICATIONS

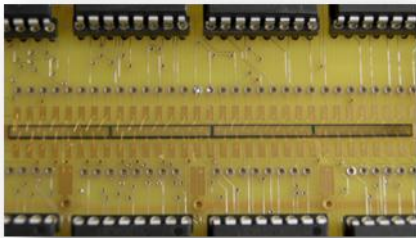
SPEED – IMAGE QUALITY

Quality control and sorting selection necessitate fast rate imaging by various means, including x-ray. In this last case, contrast and resolution of images recorded are limited by the performances of the detector especially at a fast rate. Actual x-ray detectors are Si photodiodes coupled to a scintillator materials which produce low resolution images of limited contrast when recorded at fast rate (up to several m/s).

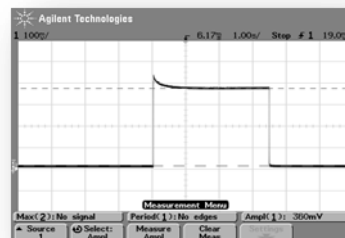
GESEC R&D developed a new type of X-ray detector. Owing to large signal it delivers the associated electronics is simpler than that of low level of the actual detector, this detector is suitable for photon counting, allowing to make also a chemical analysis of the objects during imaging, allowing to make an image of objects located inside a subject with a low dose (in the μSv range) and during the time (1s) that an object takes to pass by the barrette detector.

A barrette detector, using the transmission of X-rays through an object, allows distinct organic or inorganic materials inside or outside this object, at a low dose.

GESEC R&D detector, which converts directly X-rays photons into electrons, is sensitive to the instantaneous flux of X-rays. Since it is characterized by a fast response, it acquires the signal in a short time (in the μs range), thus allowing to reduce considerably the dose (flux multiplied by time of exposure) necessary to make an image.



Barrette of 64, 1 mm², pixels detectors.



Time dependence of the detector response (1 s/div).

The images shown below, untreated, are obtained with an acquisition time on a pixel (1 mm²) of 60 μs . The signal to noise ratio S/N of the GESEC detector is 10 times larger than that of a scintillator detector in the same conditions.

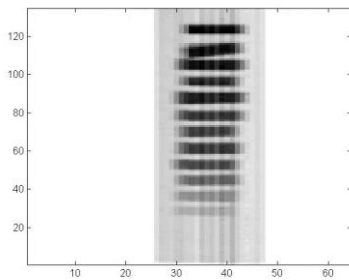


Image of Al foils of different thicknesses(40, 60, 100, 160, 200, 240, 300, 360, 400, 480, 560, 700 μm from bottom to top) at 30 kV, 30 mA, sticked on a 0.5 mm thick plastic foil.

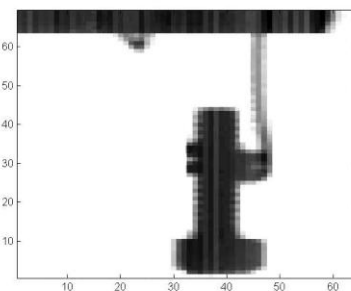


Image of a screw (length: 25 mm, diameter: 7.8 mm, pitch: 1 mm) at 60 kV, 10 mA, hold by a metallic wire.

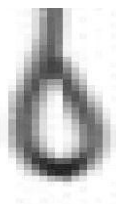


Image of a metallic wire (2 mm diameter) with a GESEC detector, (flux of 0.25 mSv/s). S/N = 10.

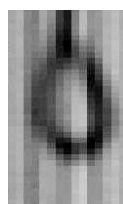


Image of metallic wire (2 mm diameter) with a scintillator (ceramic) detector, (flux of 1 mSv/s). S/N = 4.



Image of a metallic wire (2 mm diameter) with a scintillator(CsI) detector, (flux of 1 mSv/s). S/N = 4.