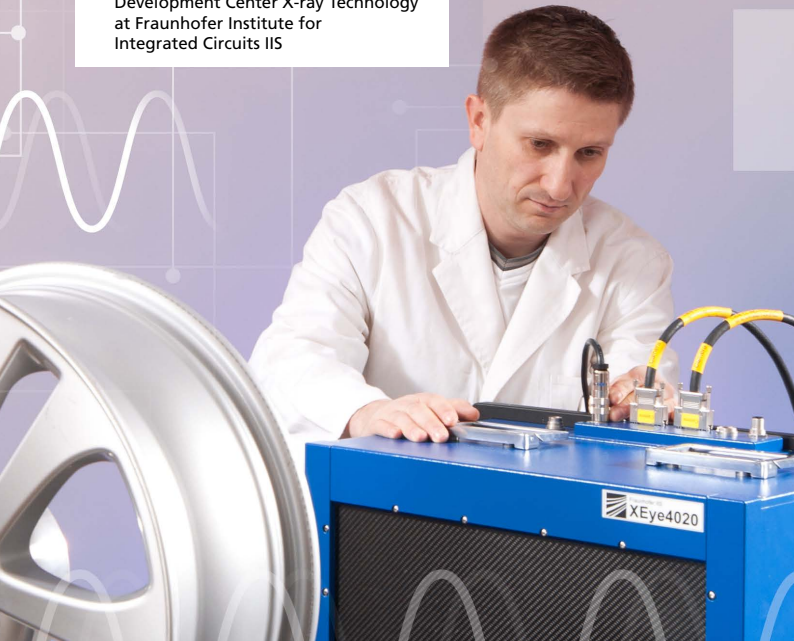




Fraunhofer
EZRT

Development Center X-ray Technology
at Fraunhofer Institute for
Integrated Circuits IIS



XEYE



**Radiation proof X-ray detectors
for industrial applications**

X-ray detectors realized to date

XEye5040, XEye4020, XEye2020

- Active area 50 x 40 cm², 40 x 20 cm², 20 x 20 cm²
- Pixel size 50 – 400 μm
- Max. frame rate up to 50 fps
- Dynamic range up to 80 dB

XEyeHS

- Active area 19 x 14 cm²
- Pixel size 100 μm
- Max. frame rate > 1600 fps
- Dynamic range > 60 dB

XEye1805

- in-pipe detector for inspection of welded seams
- Active area 18 x 5 cm²
- Pixel size 47,5 μm and 95μm
- Exposure time 0.5 – 30s
- Dynamic range > 60 dB

XEye2005

- Custom solution for inspection of welded seams
- Active area 20 x 5 cm²
- Pixel size 52 μm
- Exposure time 0.5 – 30 s
- Dynamic range > 60 dB

XEye1313

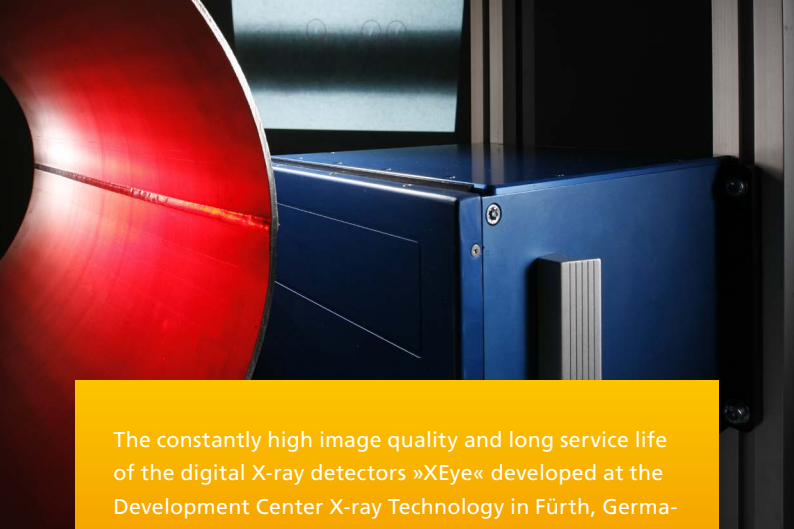
- Active area 13 x 13 cm²
- Pixel size 65 μm
- Max. frame rate up to 4.5 fps
- Dynamic range > 60 dB

XEye5005

- Switchable between TDI-linemode and area mode
- Active area 50 x 5 cm²
- Pixel size 50 – 400 μm
- Line frequency up to 10 kHz
- Frame rate up to 50 fps
- Dynamic range up to 80 dB

XScan500, XScan26

- TDI line detector
- Line length 50 cm, 26.6 mm
- Pixel size 125 – 500 μm, Pixel size 26 μm
- 256 TDI lines
- Line frequency up to 3 kHz
- Dynamic range up to 78 dB



The constantly high image quality and long service life of the digital X-ray detectors »XEye« developed at the Development Center X-ray Technology in Fürth, Germany, ensure reliable results in industrial X-ray inspection for years to come. Continuous updating of image processing parameters for automatic fault detection is no longer required due to XEye's constant image quality.

XEye detectors feature:

- Continuously high image quality
- No defect pixels
- Negligible image lag
- Exposure times down to 1ms for dynamic processes
- Exchangeable scintillator

The operating principle of these detectors is based on a scintillator screen emitting visible light when irradiated by X-rays. Multiple optical cameras capture overlapping areas of the image on the scintillator screen. These partial images are then merged seamlessly into the output image. The patented radiation shielding concept protecting all optical and electronic components from radiation up to tube voltages of at least 225kV ensures a long service life and constantly high image quality of these detectors.

Individual solutions

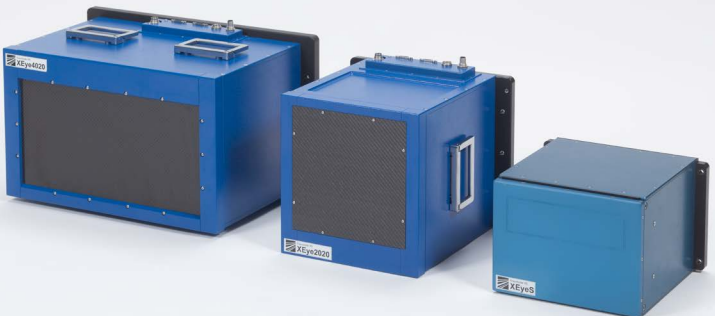
Fraunhofer EZRT develops custom X-ray detector solutions for industrial applications. The modular design allows almost arbitrary custom detector sizes to be realized, depending on the application specific requirements. Currently in development is the detector XEye5640 featuring an active area of 56 x 40 cm² and pixel sizes starting at 50 μm. This detector is designed for tube voltages up to 450 kV and is expected to be available in 2019.

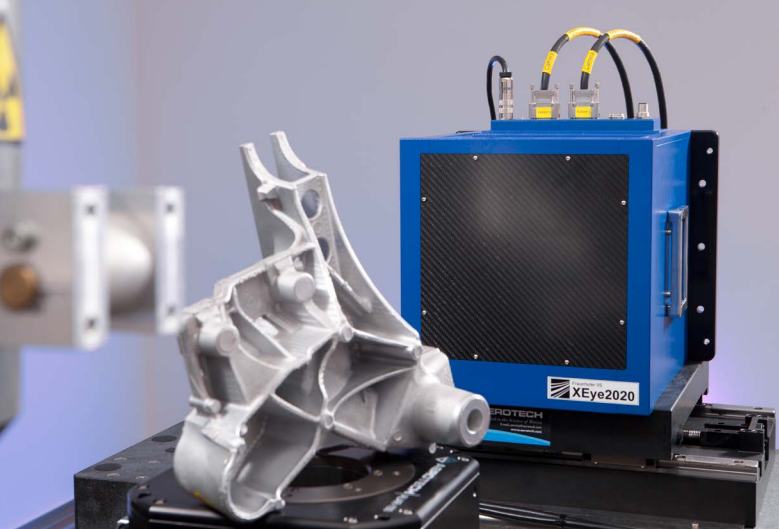
XEye's high frame rate and selectable pixel sizes can help reduce inspection time and increase the resolution of details. The detectors can be used as area or as line detectors.

Customer specific detector development

Fraunhofer EZRT develops X-ray detectors customized to the customers' requirements regarding:

- Active area
- Integration time
- Frame rate
- Pixel size
- Area detectors
- Line detectors



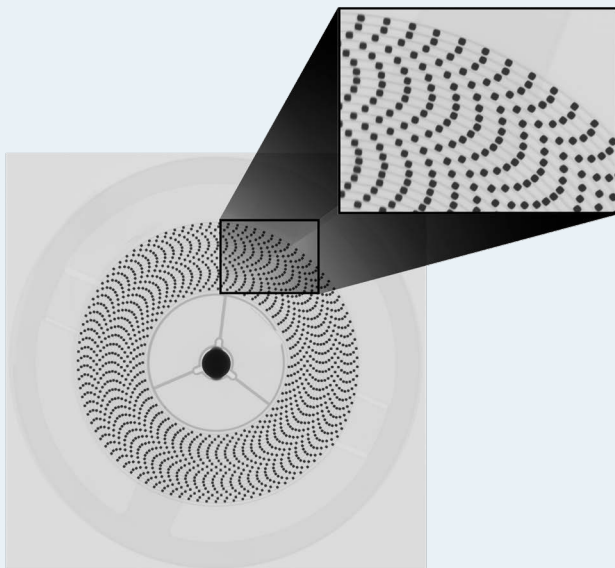


Applications

XEye X-ray detectors have been in continuous 24/7 use in a variety of industrial applications (e.g. inspection of welded seams) for more than 8 years without any detectable degradation in image quality. The automotive industry relies on XEye detectors for the inspection of cast suspension parts and wheels at production cycle.

The high frame rate allows a production integrated computed tomography system to generate 3D data of engine pistons in less than 25 seconds. Fraunhofer EZRT X-ray detectors are also used in a variety of other industrial quality assurance applications, like inspection of solder joints in electronic modules, detection of foreign materials in foodstuffs or counting SMT-components in reels.

EZRT's latest development is the high-resolution XEye5005 detector switchable between area and line mode with a pixel size of 50 μm . When used as a line detector, it operates using the TDI-principle (Time Delayed Integration), capturing moving objects e.g. on a conveyor belt with a significantly improved image quality. TDI line detectors are also available as dual-energy versions with line widths of over 1 m.



X-ray image of SMT components on a reel using XEye5005 in TDI-mode

When used as an area detector, the format of 50 x 5 cm² is ideally suited for helical computed tomography, providing 3D object data of exceptional quality.



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