



Features

- Complete tool for *in situ* gamma imaging, saving time, cost and dose
- Real-time acquisition and immediate display
- 2.35 kg/5.5 lb camera
- Excellent spatial resolution for localization of gamma-ray emitters
- High detection sensitivity even at low energies
- IP65 rated, fully decontaminable
- Battery, POE or direct powered
- Remote control and operation
- Single Ethernet cable between tablet PC and camera (up to 80 m long)
- Three coded masks available for optimized response (optional)
- Fully rugged convertible notebook
- User-friendly software

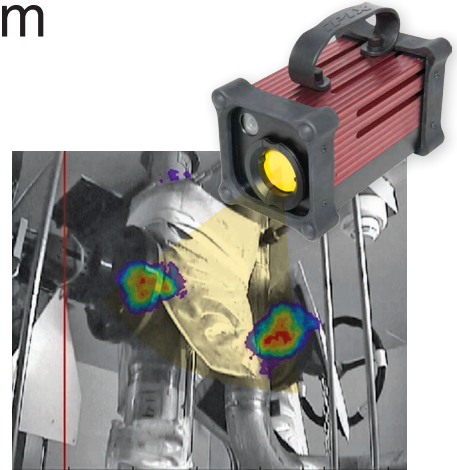
Benefits

- Compact size and lightweight for ultra portability
- Best tool to track low energy emitters (safeguards, security, fuel cycle)
- Industrial design for use in harsh environments
- Fosters the ALARA principle: Can be operated remotely minimizing exposure to the operators.
- User friendly, with push button image acquisition
- Automatic parameter settings for non-expert users
- High performance to quickly and precisely locate hot spots
- Estimates dose rate at the measurement point
- Ideal for robotic applications

iPIX Ultra Portable Gamma-Ray Imaging System

Description

iPIX is a unique gamma imager that quickly locates and identifies low level radioactive sources from a distance while estimating the dose rate at the measurement point in real time. It is the ideal tool to map a radioactive area before entering the zone, thus reducing the dose exposure (ALARA) during standard operation or decommissioning. iPIX is also the appropriate instrument to detect any suspicious radioactivity in security and safeguard applications, as well as for emergency situations such as Fukushima.



Technology

iPIX integrates the GAMPIX technology developed by the Atomic Energy Commission (CEA) in France. It is based on a 1 mm CdTe detector bonded to a pixilated CMOS chip – the Timepix sensor developed at the CERN research center – a coded mask and mini optical-camera.

The coded mask aperture allows for background noise subtraction by means of a technique called mask/anti-mask differentiation. This greatly contributes to the reduced size and weight of the gamma imager. The mask automatically rotates to the anti-mask position based on the measurement conditions (background and source activity).

The radioactivity mapping is automatically superimposed onto the visible image of the scene of interest.



Application

iPIX is a real-time ultra-portable gamma-ray imaging system mostly designed for *in situ* gamma measurements to locate radioactivity at nuclear sites. When planning for maintenance or decommissioning operations, it can be used to provide radiation intensity maps of the area. During radiological accidents, emergency situations, reactor outages or even routine area surveys where radiological conditions are subject to change (e.g., near piping), iPIX can help find radiological hot spot locations and quickly determine the boundaries of contaminated areas.

iPIX requires very little shielding while maintaining an excellent signal to noise ratio. This translates into a lightweight device (2.35 kg/5.5 lb) with a compact design (9 x 9 x 18.8 cm/3.5 x 3.5 x 7.4 in.) that can easily be deployed and transported in the field. The camera can be installed on a standard or motorized tripod that allows remote positioning of iPIX to focus on the area of interest.



iPIX: Ultra Portable Gamma-Ray Imaging System

Unprecedented performance can be achieved with iPIX:

- The spatial resolution ranges from 2.5° to 6.0° depending on the coded masks used, allowing iPIX to image two hot spots close to each other.
- A very high sensitivity from low to high energy – 70 frames of 1 second to image 2 nSv/h (.2 µRem/hr) of Am-241 with R7-4 mask and 500 frames of 1 second to image 100 nSv/h (10 µRem/hr) Cs-137 with R7-8 mask – supports very quick imaging capabilities.
- The energy range covers 30 keV to 1.2 MeV to image a wide variety of hot spots.
- A 45° field of view allows the imaging of a large section of a room to be imaged in one shot.

iPIX has been designed to withstand shocks and vibrations common to industrial environments. It is rated IP65 and can easily be decontaminated. The camera can be battery operated, powered directly or through POE. A single Ethernet cable (up to 80 m/250 ft long) between the camera and the PC is needed. It is therefore easy to operate the camera from a distance and minimize dose exposure on site. This supports the use of iPIX for robotic applications.

All acquisition parameters are adjusted automatically based on the measurement conditions (background and source activity), including the automated mask/antimask rotation period.

The iPIX software has been designed for non-experts to easily acquire images and quickly identify hot spots. It is intuitive and features zoom, pan and tilt control from a single interface. Intermediate thumbnails are displayed during the acquisition to follow the progress, easily differentiate artefacts from signal and go back in the acquisition history when needed. After the acquisition step, a post acquisition image analysis is possible to estimate dose rate. An expert mode is also available to set acquisition time to longer periods.



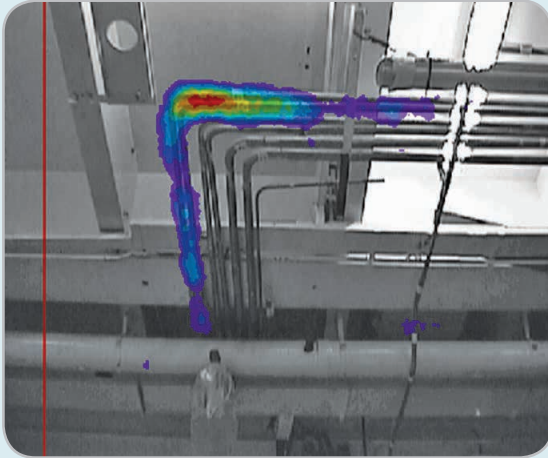
iPIX also supplies input for quantitative gamma spectroscopy measurements of radioactive wastes or *in situ* radioactivity. It provides an easy-to-interpret record of where the radioactivity is located, and therefore how to model it more accurately with ISOCSTTM. iPIX can be coupled with MERCURAD[®], CANBERRA's dose-calculation software, which can greatly benefit from the iPIX output showing where the radioactivity is located.

iPIX Typical Applications

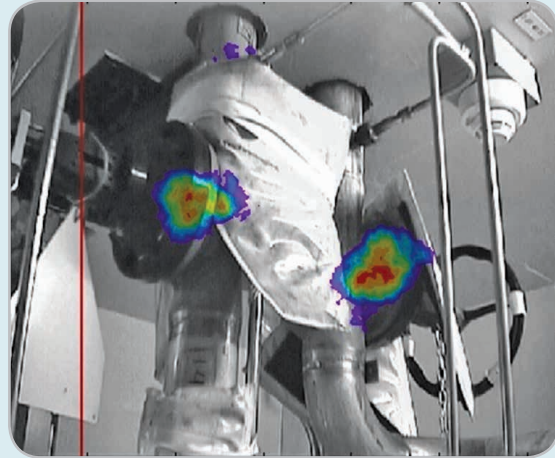
- Monitoring of maintenance and decontamination operations
- Initial dose rate mapping in preparation of maintenance or dismantling scenarios
- Suitable for pipeline measurements
- Source localization prior to decontamination
- Planning for maintenance during outages of nuclear power reactors
- Realistic pictures showing workers radioactive areas with estimated dose rate
- Inspection of radio-chemical process (tanks, drums, pipelines)
- Radiological inventory prior to dismantling
- Maintenance and localization of hot spots in reprocessing plants
- Industry with difficult nuclear conditions (high dose rates, hot cells, unreachable areas)
- Emergency situations such as: spills, transportation accidents, fires, terrorist "dirty bombs", etc...
- Better and faster results with high activities (Total Cost of Ownership: financial gain, operational gain due to faster acquisitions which is not the case for the scanning systems)
- Reduced exposure with improved job planning (according to the ALARA principle)
- Robotics
- Remote survey of radiological conditions
- Evaluation and dimensioning of protective shielding
- Cost-effective sorting of nuclear wastes

iPIX: Ultra Portable Gamma-Ray Imaging System

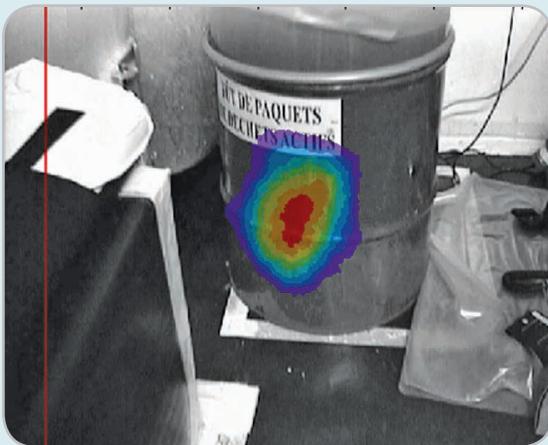
EXAMPLES OF REAL LIFE APPLICATIONS WITH iPIX



Extended hotspot detected while surveying piping.



Checking shielding protection efficiency in NPP.



Waste measurement.



Illicit nuclear material trafficking.

iPIX: Ultra Portable Gamma-Ray Imaging System

Specifications

PERFORMANCE

ENERGY RANGE – 30 keV to 1.2 MeV.

DETECTOR SENSITIVITY*

- 70 frames of 1 second to image 2 nSv/h (.2 µRem/hr) of Am-241 with R7-4 mask.
- 500 frames of 1 second to image 100 nSv/h (10 µRem/hr) Cs-137 with R7-8 mask.

FIELD OF VIEW

- 48.8° with Rank 13/2 mm thickness mask.
- 46.4° with Rank 7/4 mm thickness mask.
- 41.4° with Rank 7/8 mm thickness mask.

SPATIAL RESOLUTION*

- 2.5° with Rank 13/2 mm thickness mask.
- 6.0° with Rank 7/4 mm thickness mask.
- 5.0° with Rank 7/8 mm thickness mask.

MAXIMUM DOSE RATE (Cs-137) – Performance linear up to 10 Sv/h (1000 R/h).

BATTERY LIFE – Up to 4 hours.

PHYSICAL

ENVIRONMENTAL

- SHOCKS – Resist to 60 cm/2 ft vertical drop.
- VIBRATIONS – 2 g between 10 Hz and 33 Hz during 15 minutes.
- OPERATING TEMPERATURE – -10 °C to 45 °C (14 °F to 113 °F).
- HUMIDITY – 0 to 93% at 35 °C.
- IP RATING – IP65.

DIMENSIONS AND WEIGHT

- 2.35 kg (5.5 lb) without battery.
- 2.5 kg (6.2 lb) with battery.
- LENGTH – 188.5 mm (7.4 in.).
- HEIGHT – 90 mm (3.5 in.).
- WIDTH – 90 mm (3.5 in.).

POWER SUPPLY – Choice of:

- Direct power supply 90-260 V, 47-63 Hz.
- Battery.
- Power Over Ethernet (POE).

COMMUNICATION

- 10/100 Mbps Ethernet.

COMPUTER

- PROCESSING UNIT – Intel® Core™ i5 vPro™ Technology.
- STANDARD SOFTWARE – Based on Windows® 7/64-bit operating system.
- DATA RECORDING – Gamma/ video images may be stored on disk, printed or transferred via a network.



POWER SUPPLY

- AC Adapter (90 W, 100-240 V ac, 50/60 Hz).
- Li-Ion smart battery (8700 mAh) (up to 5 hours of battery life).

DIMENSIONS AND WEIGHT

- 314 x 222 x 49 mm (12.4 in. x 8.74 in. x 1.93 in.).
- 2.7 kg (5.95 lb).

ENVIRONMENTAL

- OPERATING TEMPERATURE – -20 °C to 60 °C (-4 °F to 140 °F).
- STORAGE: -30 °C to 71 °C (-60 °F to 160 °F).
- HUMIDITY – 95% Relative Humidity, non-condensing.

ORDERING INFORMATION

BASE MODELS:

- EM96680 – iPIX KIT (French).
- EM96681 – iPIX KIT (English).

INCLUDES:

- Real-time portable Gamma-ray imaging system
- Mask #2 (rank 7/4 mm thick)
- 2 m (6 ft) and 10 m (32 ft) Ethernet cables
- Software
- Fully rugged convertible notebook
- Manual Tripod
- Dedicated transport case
- POE injector
- USB key
- Bumpers and handle
- User Manual
- Power cables

OPTIONS AND ACCESSORIES

ADDITIONAL MASKS

- EM95708 – Mask #1, rank 13/2 mm thick for low energies.
- EM95710 – Mask #3, rank 7/8 mm thick for high energies.

ETHERNET CABLES

- EM98505 – 50 m (160 ft) Ethernet cable.
- EM98504 – 80 m (256 ft) Ethernet cable.

TRIPODS

- EM96795 – Motorized tripod including Pan & Tilt, tripod, cable and case.

BATTERY

- EM95555 – Additional battery for iPIX imager.



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