ISEC Monitoring Systems

Portfolio Overview

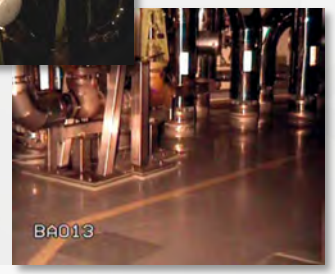
2019 - ISEC Catalogue

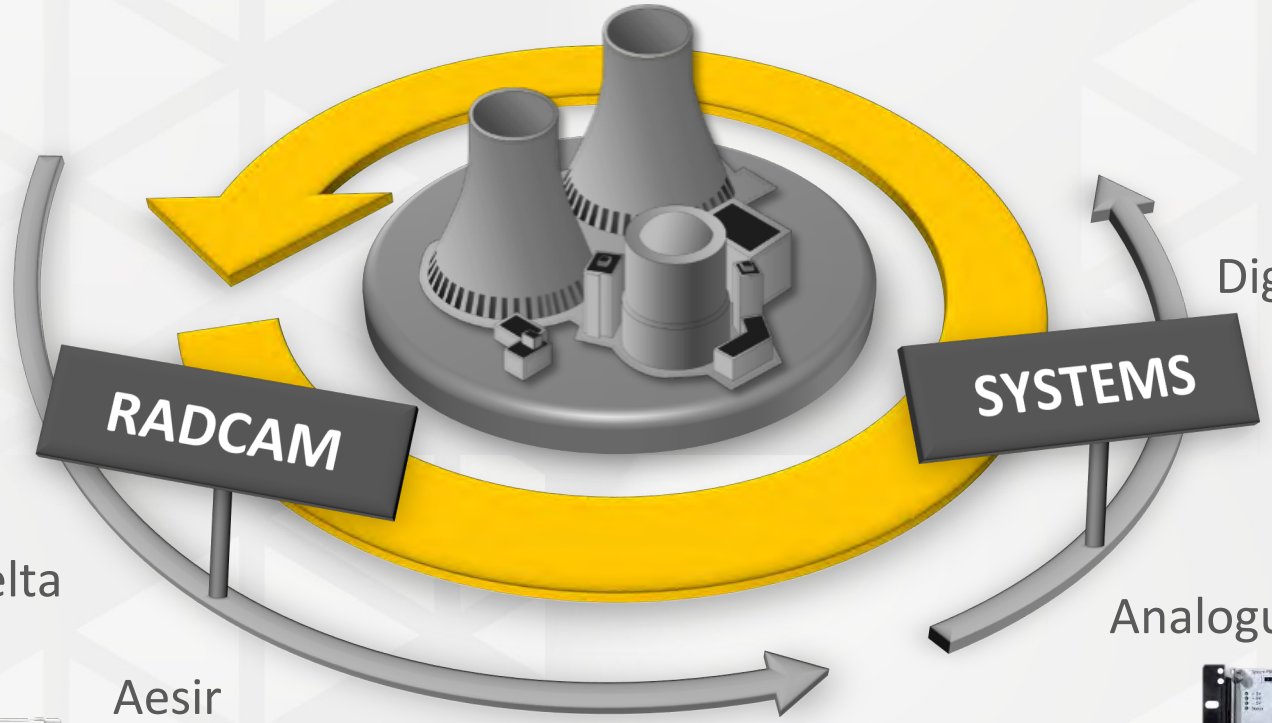
360° Nuclear Monitoring Offer

Epsilon

Omega

Delta





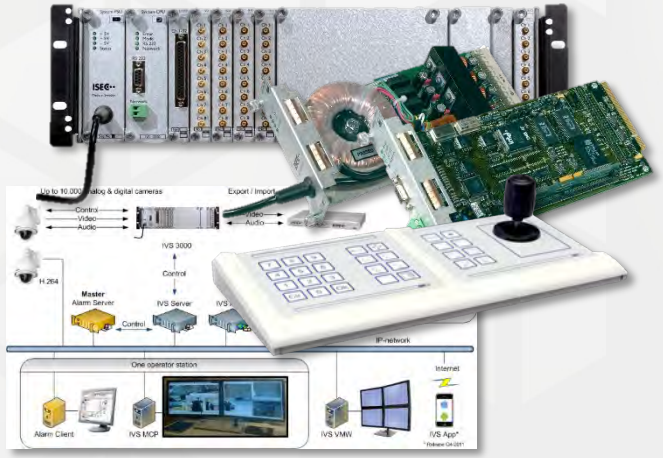
Aesir

Sigyn

Loki

Digital

Analogue



RADCAM
Epsilon / Omega

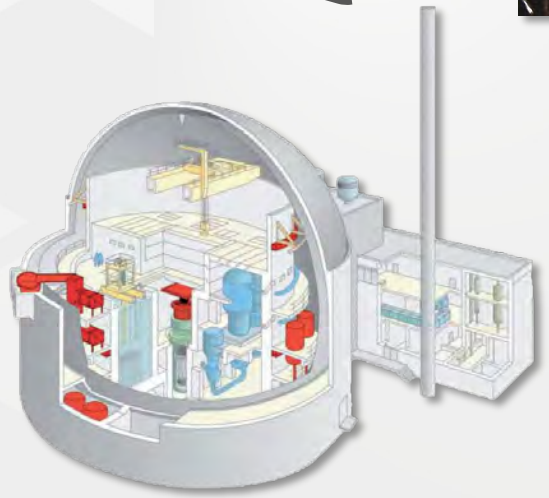
RADCAM Epsilon / Omega

Permanent Monitoring Solution

Technical specifications

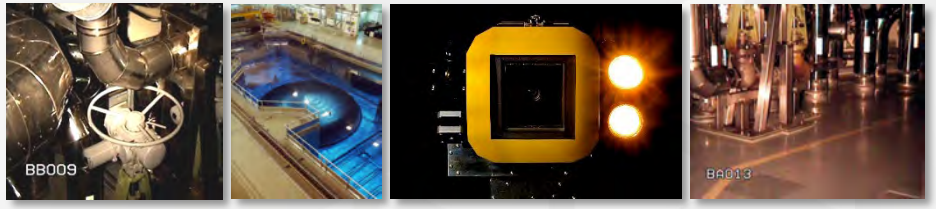
Camera module	
Sensor	¼" day/night color sensor (670 TVL)
Minimum lighting	0.7 lux at F1.6, 1/50s and 50 IRE
Optical zoom	28x f=3.5mm (Wide) to f=98mm (Tele)
Viewing horizontally	55.8°-1.6° from wide to tele
S/N ratio	75 dB due to thermoelectric cooling
Focus / Iris	Yes, auto and manual
Physical features	
Pan / Tilt	± 180°, .045° / ± 90°, .045° (Variable speed)
Lamps	2x 35W following the Pan/Tilt
Size	H: 430mm L: 460mm W: 350mm
Weight	30 kg (58.4 Lb.)
Power Supply	230/110/100/24 VAC - 50/60 Hz
Communication	
Video Output	BNC or Balanced 2-wire (1 VPP/75 or 120 Ω)
Control Output	LonWorks or Pelco D (RS-422 / RS-485)
Audio (optional)	FM or Balanced 2-wire
Environment	
IP class	IP 65 (Sensor Module)
Operating Temp.	5–65°C (40-150°F), max 90°C (195°F) for 8 h
Humidity	0 – 100% RH, non-condensing
Vibration	2 – 9 Hz 1.5mm, 9 – 200 Hz acc. 5m/s²
Pressure	5 Bar above normal atm. pressure
Radiation	
Type of Protection	Neutron and Gamma Protection
Dose | Dose Rate (*)	> 2000 Gray | > 200 Gray/h
Internal sensor	Internal radiation damage sensors

>300 REFERENCES



Applications in NPPs

- General View & Inspection
- Environment Monitoring
- Steam & Oil Leaks
- Equipment Surveillance
- Human Presence
- Fire Watch



Reactor Building

- Refuelling Floor
- Above basement
- Under RPV
- Containment basement
- Containment doors
- Pump house

Auxiliary Building

Spent Fuel Building

Radwaste Building

Radwaste Storages

Turbine Building

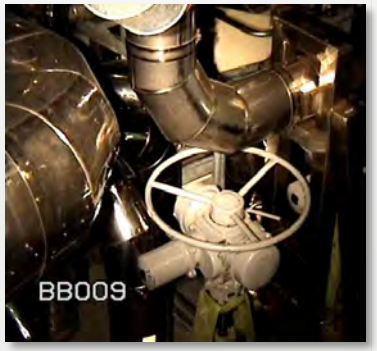
Balance of Plant

(*) For RADCAM Spare Parts (Sensor and Control Modules)

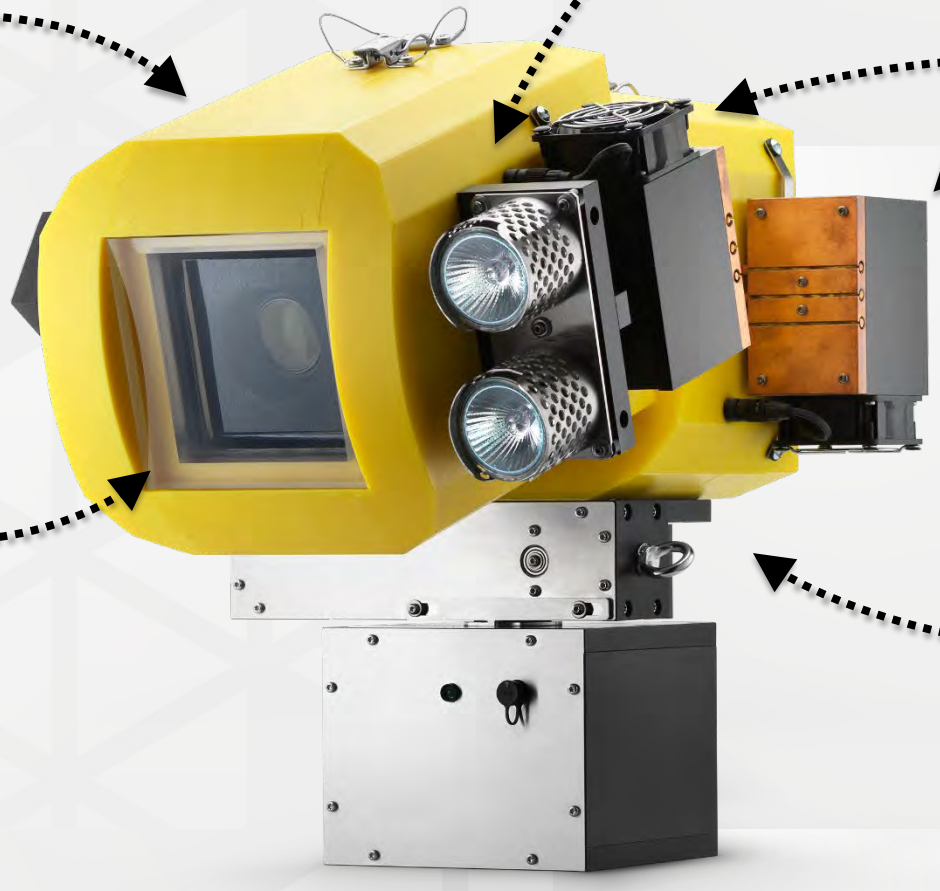
RADCAM Epsilon / Omega

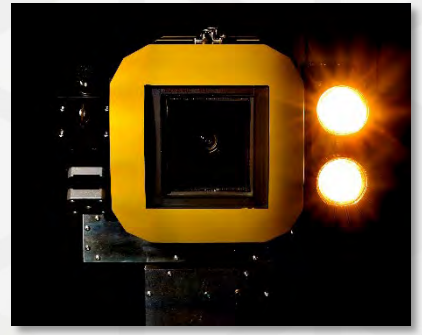
Permanent Monitoring Solution

Unique Radiation Suppressing Camera Body



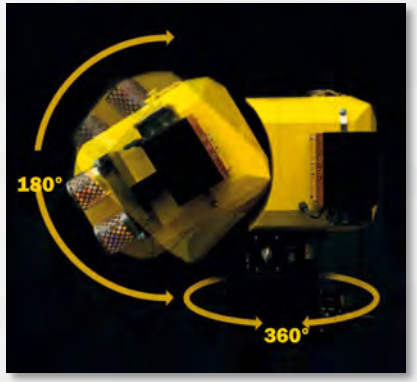
X28 Optical Zoom
Auto Focus
HQ Color Image





Spot and Flood Halogen Lamps

Twin Cooling System



Variable Speed PTZ

RADCAM Epsilon / Omega

Permanent Monitoring Solution

Designed with and for NPPs operators

- Dynamic **high-quality color imaging** (670 TV Lines ~ 720x480 Pixels)
- **Full sensor optimization and control** (Light Contrast, Gamma & Color balance …)
- **0.01° positioning** accuracy
- **360°** pan and **180°** tilt
- True **x28 optical zoom**
- **Variable PTZ speeds**
- **Spot and flood** halogen lamps
- **0.7 LUX** light sensitivity
- **High S/N ration** giving very low noise
- **Optional audio** improves in containment analysis (Mechanical issues, vibrations, leaks…)

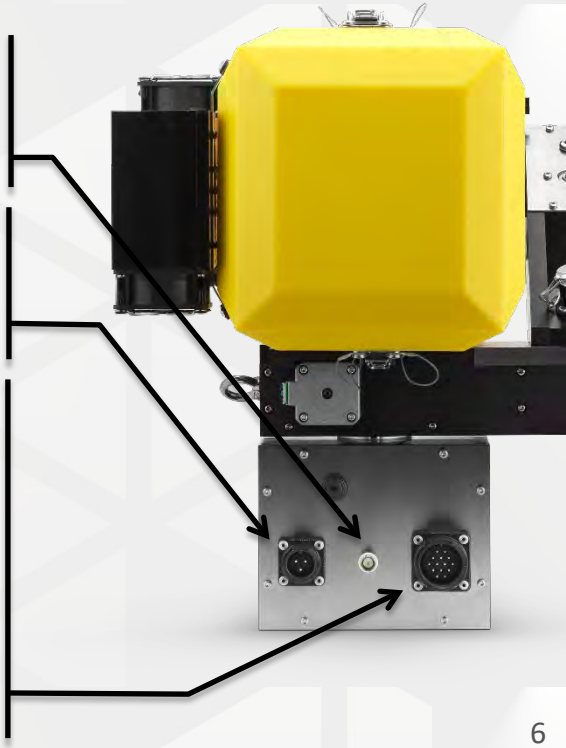
Easy connection

- Easy **connection to existing video systems**
- Use **existing cables**
- **Minimum changes** to existing hardware and documentation.

Video Out 1
(PAL or NTSC on Coax)

Power
(230/110/100/48/24 VAC)

Video Out 2
(balanced, 2-wire)
FM Audio
(balanced, 2-wire)
ISEC Protocol
(LonWorks, 2-wire)
Pelco D Protocols
(RS-422/485, 2&4 wire)



RADCAM Epsilon / Omega

Permanent Monitoring Solution

Servicing and Maintenance

- Intelligent camera – **collects statistics**
  - RADCAM **logs and stores all important data**
  - **All data is retrievable** (During operation and Maintenance round)
  - **Serial data service connector**
  - Windows **test program** (with maintenance client)
- **Preventative Maintenance Program** (PMP)
  - Downloads camera status **during production**
  - Report indicates **expected equipment life span**
  - Estimates **Integrated Exposure** to date.
  - Stand-alone software or plug-in for 3rd part VMS
  - Critical parameters can **generate alarms** (temperature, power …)

Spare Parts

All Spare Parts can be replaced in only minutes with screw & torque driver. All actions can be performed with gloves and protective clothing.

RADCAM
Delta

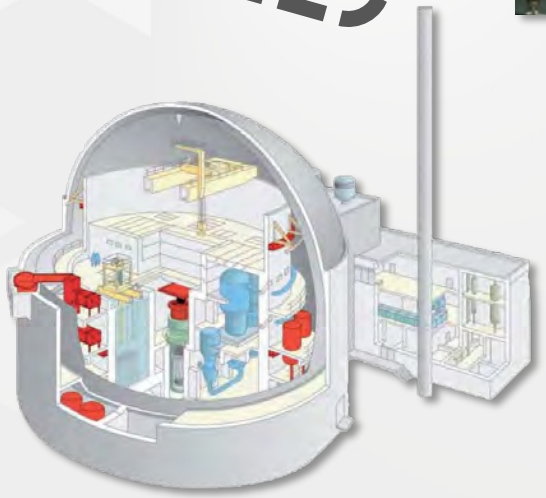
RADCAM Delta Analog

Permanent Monitoring Solution

Technical specifications

Camera	
Sensor	1/3” CMOS color sensor (768x576 pixel)
Minimum lighting	0.7 lux at F1.6, 1/50s and 50 IRE
Optical zoom	3x with Focal length 3 – 9 mm
Viewing horizontally	Wide: 113,7°x61,1° Tele: 38,0°x21.4°
Aperture (F)	F1,3
Focus / Iris	Iris: Auto / Manual – Focus: Manual
Physical features	
Size	H: 222mm L: 177mm W: 106mm
Weight	6 kg (13.2 Lb.)
Power Supply	230 V AC – 6 VA
Communication	
Video Output	BNC or Balanced 2-wire (1 VPP/75 or 120 Ω)
Max Frames rate	25 Fps (PAL)
AUX Control	Output relay (NO and NC) Max 230 VAC/1A
Data Communication	Pelco D (RS-422 / RS-485)
Environment	
IP class	IP 65
Operating Temp.	5–60°C (40-140°F)
Humidity	0 – 100% RH, non-condensing
Vibration	2 – 9 Hz 1.5mm, 9 – 200 Hz acc. 5m/s²
Pressure	5 Bar above normal atm. pressure
Radiation	
Type of Protection	Gamma Protection
Dose | Dose Rate	> 2000 Gray | > 200 Gray/h
Internal sensor	Internal radiation damage sensors

>25 REFERENCES since 2018



Applications in NPPs

- General View & Inspection
- Environment Monitoring
- Steam & Oil Leaks
- Equipment Surveillance
- Human Presence
- Fire Watch

Reactor Building

- Refuelling Floor
- Above basement
- Under RPV
- Containment basement
- Containment doors
- Pump house

Auxiliary Building

Spent Fuel Building

Radwaste Building

Radwaste Storages

Turbine Building

Balance of Plant

RADCAM Delta Analog

Permanent Monitoring Solution

Designed with and for NPPs operators

- Crisp and clear **color imaging**
- **Fixed, small** and **lightweight**
- Versatile with **3X optical zoom** (option for 28x)
- Can be combined with **external lights**
- **Pure analog** design and construction
- Made for **radioactive environments**:
  - Dose rate: **200 Gray/h**
  - Integrated dose: min. **2000 Gray**

Easy connection

- Easy **connection to existing video systems**
- Use **existing cables**
- **Minimum changes** to existing hardware and documentation.

Flamanville 3 (EPR)

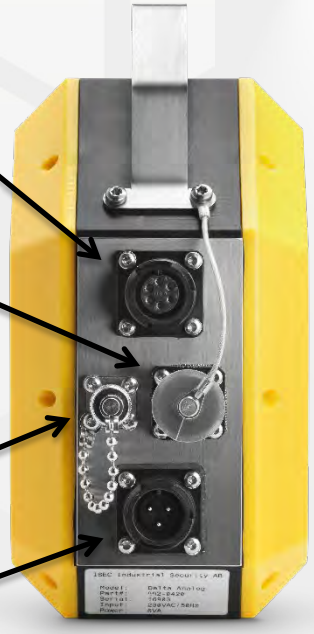
Loviisa NPP (VVER)

Pelco D Protocols
(RS-422/485, 2&4 wire)

Auxiliary controls
(NO and NC) Max 230 VAC/1A

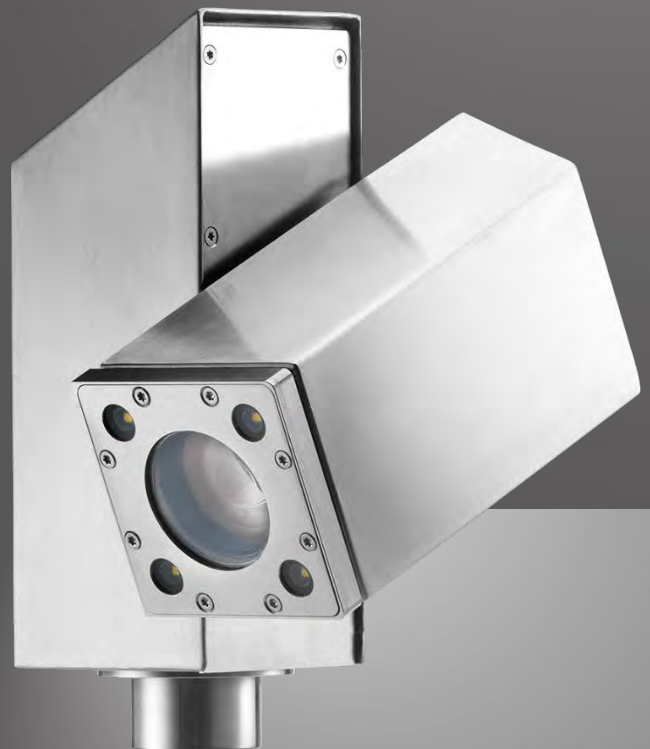
Video Out
(PAL or NTSC on Coax)

Power
(230 VQC - 6 VAC)



ISEC
MONITORING SYSTEMS

RADCAM
Sigyn



NEW
PRODUCT

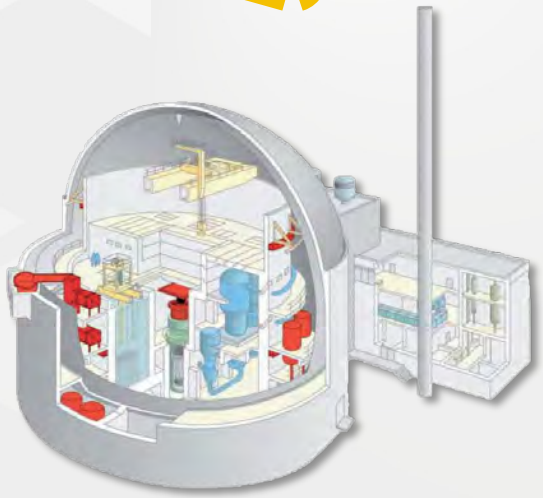
RADCAM Sigyn

Fast Deployment Digital Solution

Technical specifications

Camera	
Sensor	HD Resolution 720P (720*1280)
Minimum lighting	0.5 Lux @ F1.6
Optical zoom	18x with Varifocal zoom lens (Prel)
Viewing horizontally	55,2°- 3.2° from wide to tele (Prel)
Focus / Iris	Yes, auto and manual
Physical features	
Pan / Tilt	Pan – 350° / Tilt - 180°
Lamps	4 LED Lights following the Pan/Tilt
Size	Head H: 250 mm L: 160 mm W: 75 mm Main Unit H: 225 mm L: 225 mm W: 85 mm
Weight	Head 3.5 kg (8 Lb.) / Unit: 20 kg (44 Lb.)
Power Supply	PoE Type 3, Class 6 (60W)
Communication	
Video Output	H264, MJPEG
Framerate	Max 25/30 fps
Control Output	ONVIF
Environment	
IP class	IP 65
Operating Temp.	5–60°C (40-140°F)
Humidity	0 – 100% RH, non-condensing
Radiation	
Type of Protection	Gamma Protection
Dose | Dose Rate	> 1000 Gray | > 100 Gray/h
Internal sensor	Internal radiation damage sensors

NEW PRODUCT



Applications in NPPs

- General View & Inspection
- Environment Monitoring
- Steam & Oil Leaks
- Process Surveillance
- Human Intervention
- Fire Watch
- Abnormal Monitoring
- Temporary Surveillance
- Emergency Surveillance

Reactor Building
- Refuelling Floor
- Above basement
- Under RPV
- Containment basement
- Containment doors
- Pump house

Auxiliary Building

Spent Fuel Building

Radwaste Building

Radwaste Storages

Turbine Building

Balance of Plant

RADCAM Sigyn

Fast Deployment Digital Solution

Light PTZ Radiation hardned HD camera (720p)

Easily deployable anywhere

Radiation hardned IP65 Control Unit with Power over Ethernet

Long communication cable between Head and Control Unit (up to 8 m)

RADCAM Sigyn

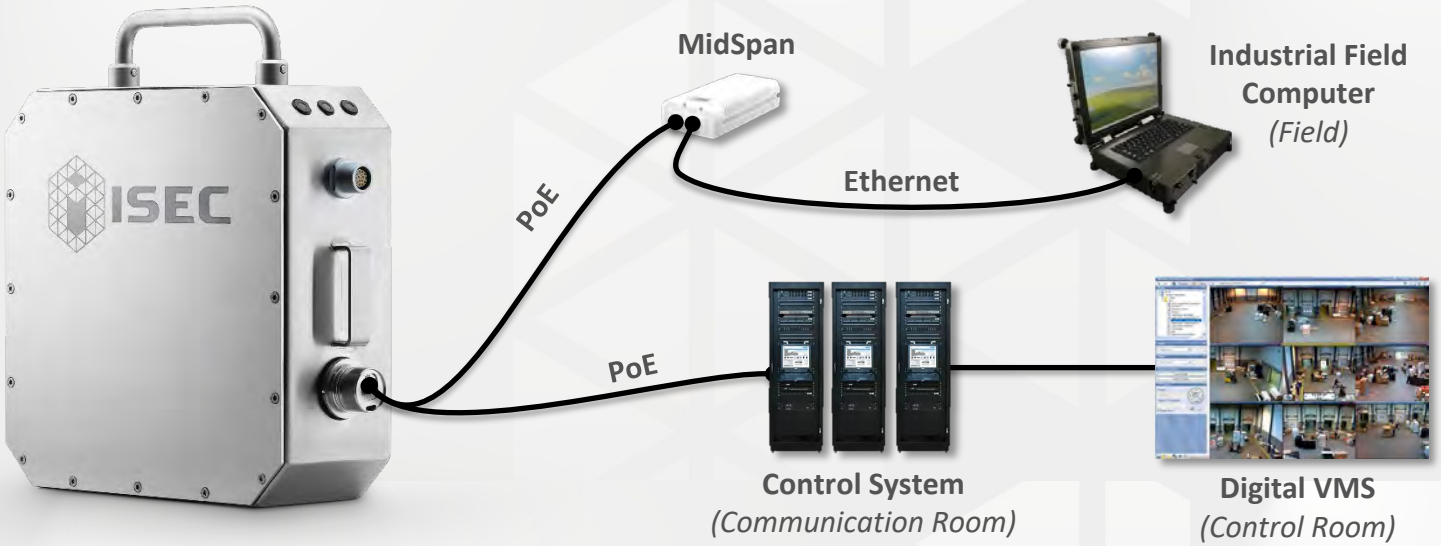
Fast Deployment Digital Solution

Designed with and for NPPs operators

- **Agile** and **flexible** design
- **IP65, Compact** and **lightweight**
- Pan, Tilt, with **18X optical zoom**
- High focus on **FME** and usage of **approved materials**
- **Pure Digital** design and construction
- Made for **radioactive environments**:
  - Dose rate: **100 Gray/h**
  - Integrated dose: min. **1000 Gray**

Fast Deployment

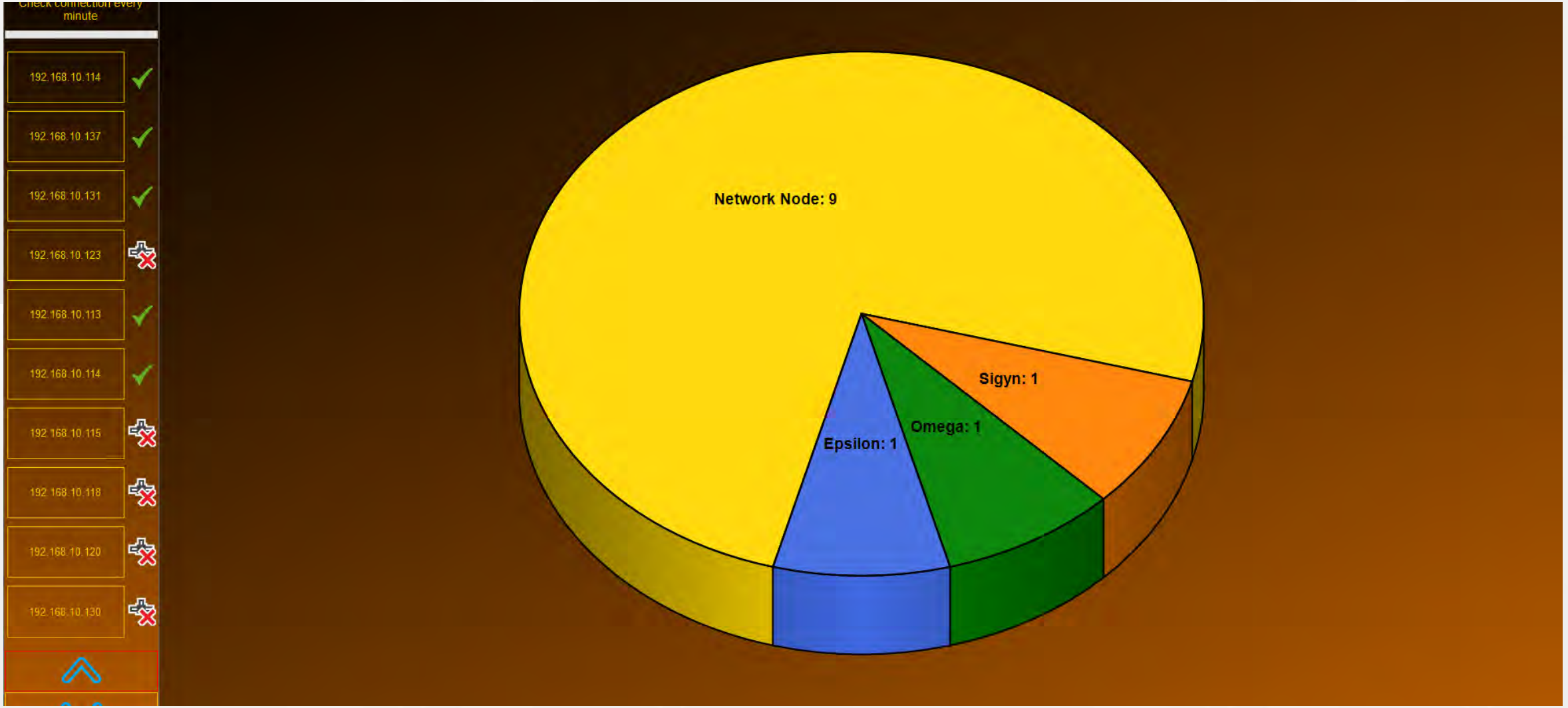
- Easy connection to any **digital video systems**
- **1 Single Cable** connection (PoE)
- **100% adapted** for field or permanent deployment
- **Various mounting** possibilities



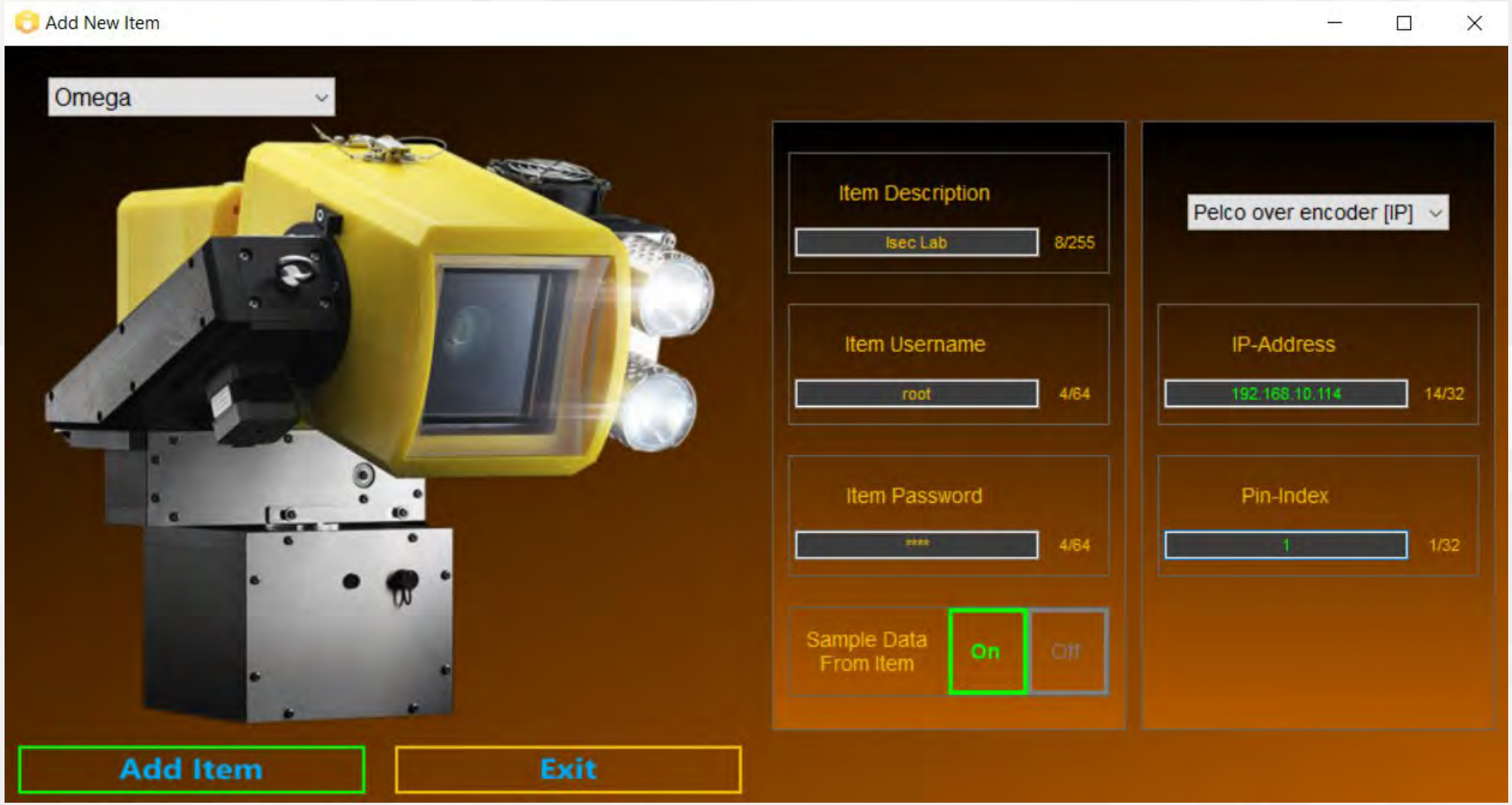
ISEC
PMP Software

PMP Software
Permanent Monitoring Solution

PMP Software
Permanent Monitoring Solution



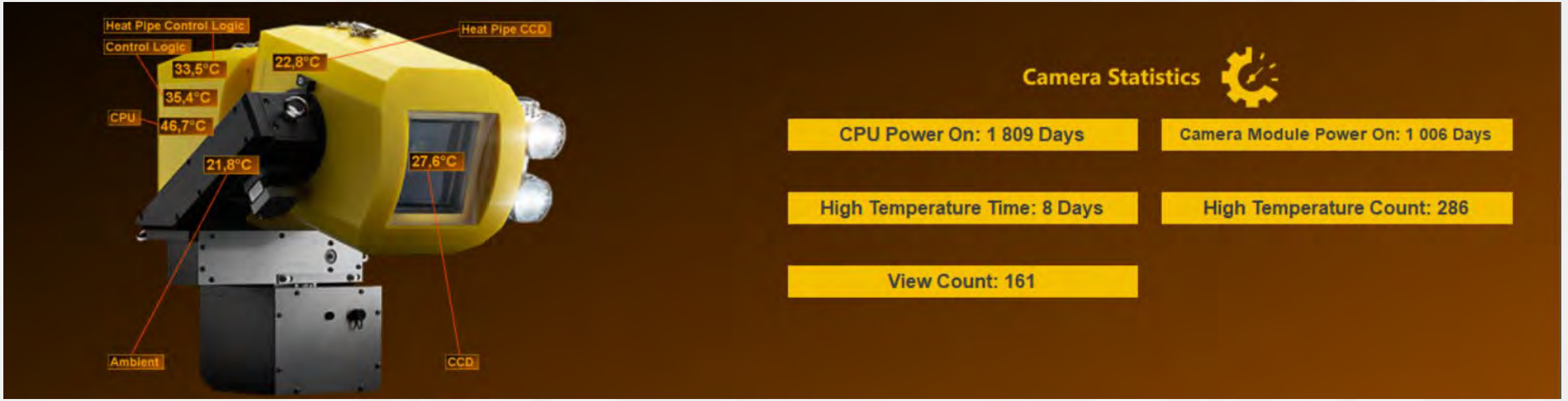
PMP Software
Permanent Monitoring Solution



PMP Software

Permanent Monitoring Solution

PMP Software
Permanent Monitoring Solution



RADCAM Loki

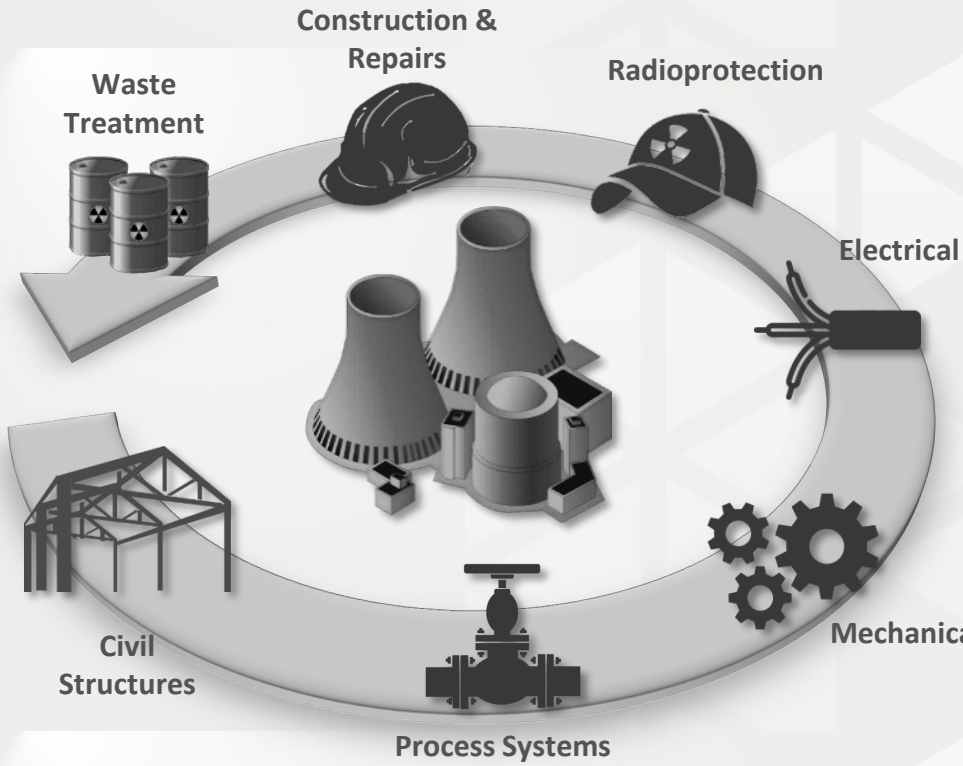
NEW PRODUCT

RADCAM Loki

The Innovative Inspection Solution

RADCAM Loki is ISEC's newest radiation tolerant camera designed to allow the operator to view areas which are normally out of reach.

RADCAM Loki is an innovation for **EVERYONE !**

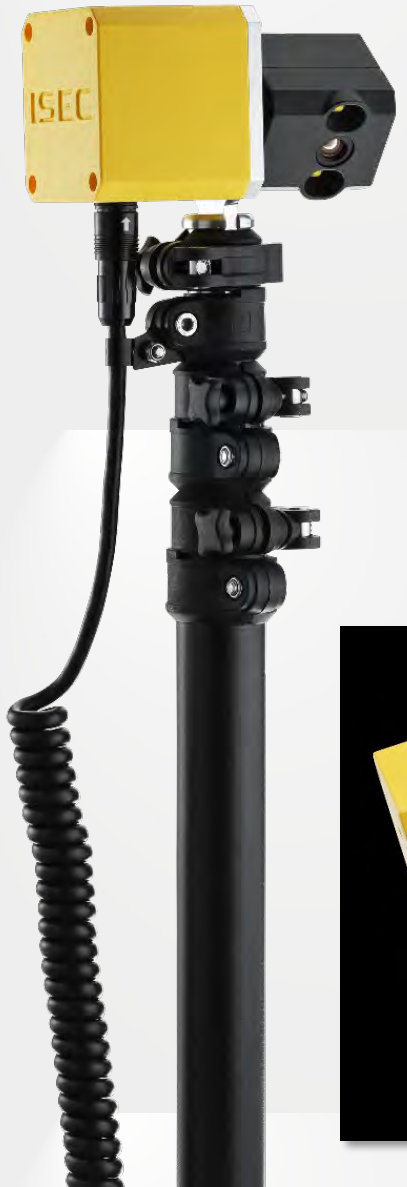


The result of successful collaboration with Ringhals NPP, Sweden

- **Imagined by maintenance** operators at Ringhals
- **Prototyped by ISEC** in 2018
- **Tested 12 months in real conditions** by Ringhals Maintenance departments (15 operators)
- **Optimized and improved** based on field feedbacks
- First product launched: **Summer 2019**
- Used in Ringhals since **July 2019**
- Already **huge savings** generated by Ringhals

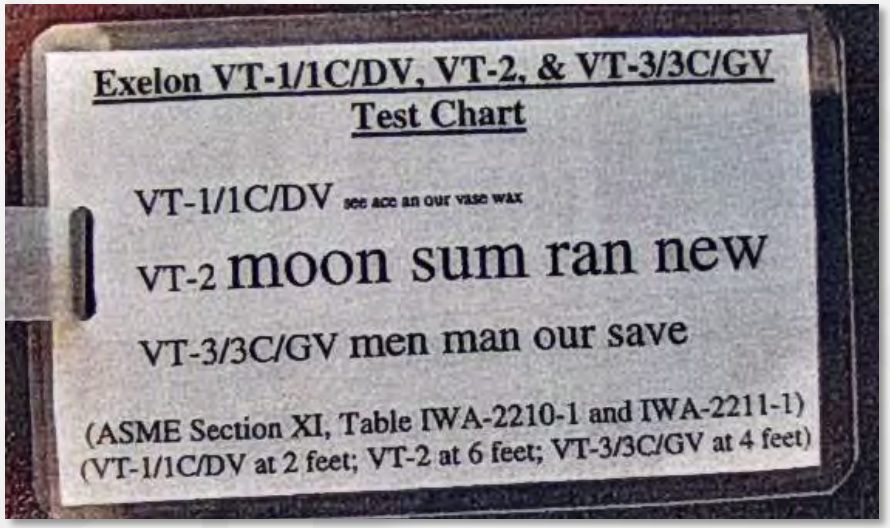
RADCAM Loki

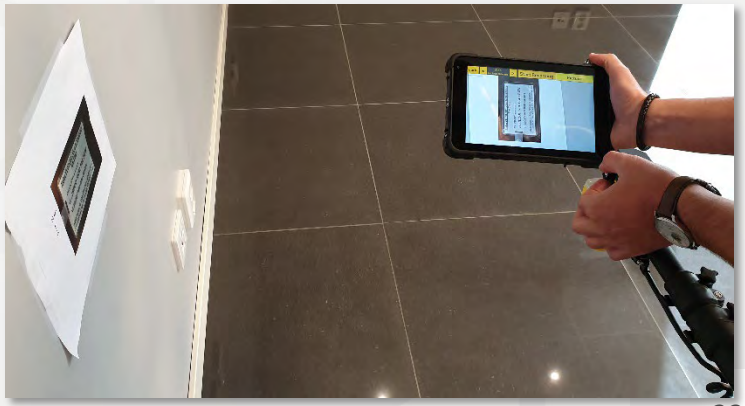
The Innovative Inspection Solution



Loki Camera Head key features

- **Superb colour images** in high resolution (720p)
- **Very good light sensitivity** (0.2 Lux @ F2.5)
- **Modular** and **changeable** (the head is a spare part)
- **Tilt function +/- 90°** (remotely controllable)
- **2 powerful LED lights** to see clearly in dark places.
- **Resistant to radiation** at least up to **1 kGray**
- **Adjustable focus** to see clearly from a **few cm to meters away** (compatible for VT-1 and VT-3 – US)



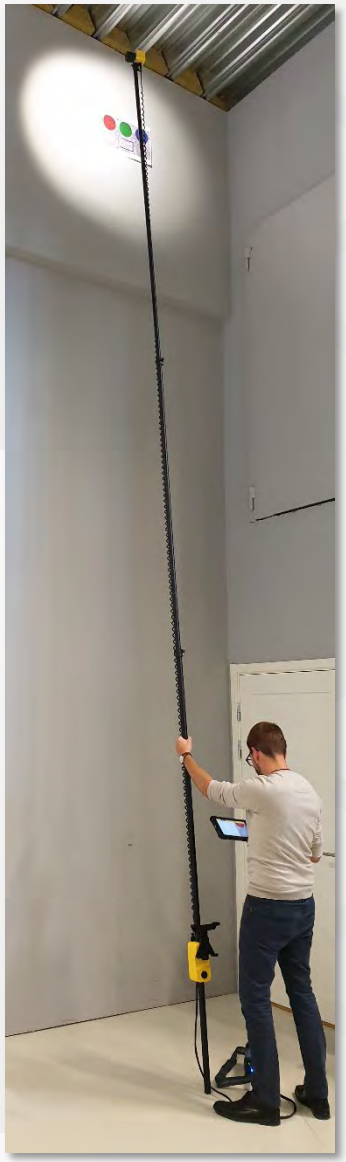


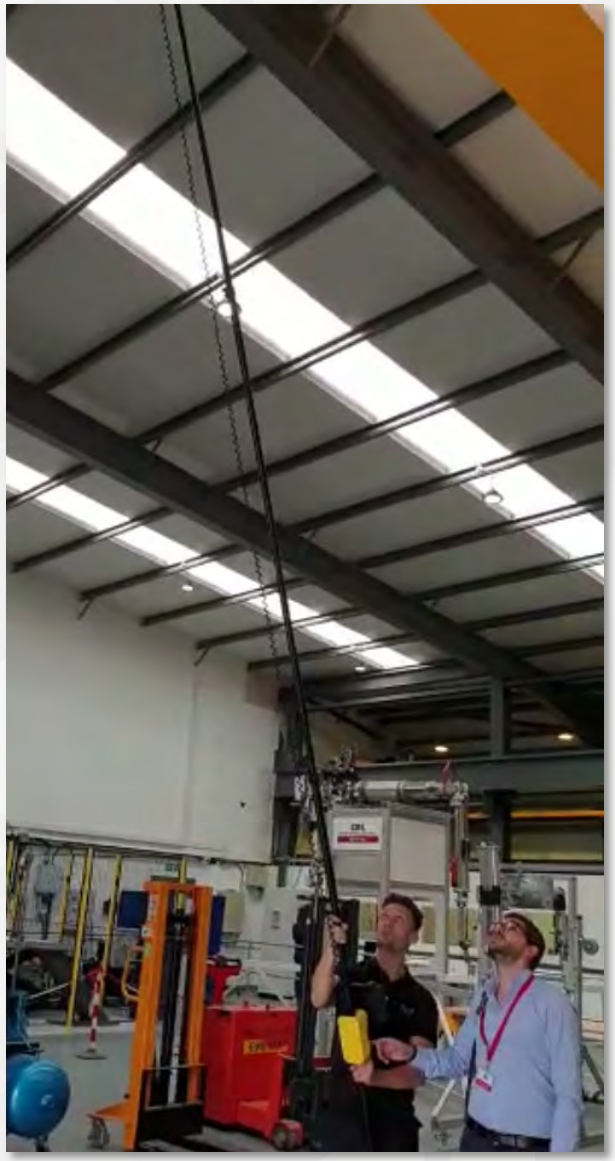
RADCAM Loki

The Innovative Inspection Solution

Loki Frame key features

- **Ultra light:** 2.4 Kg (5.5 Lb.)
- **Telescopic:** 2 to 6 m (6ft 11" - 20ft)
- **1 man operation** compatible
- **Fully portable**: No field computer or viewing station required
- **Rechargeable battery**: 6 hours continuous operation
- **Robust** Design and Construction



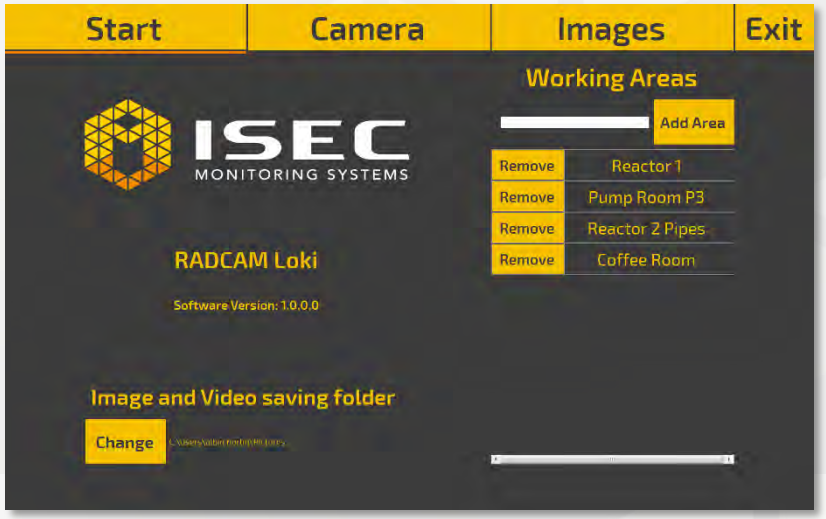


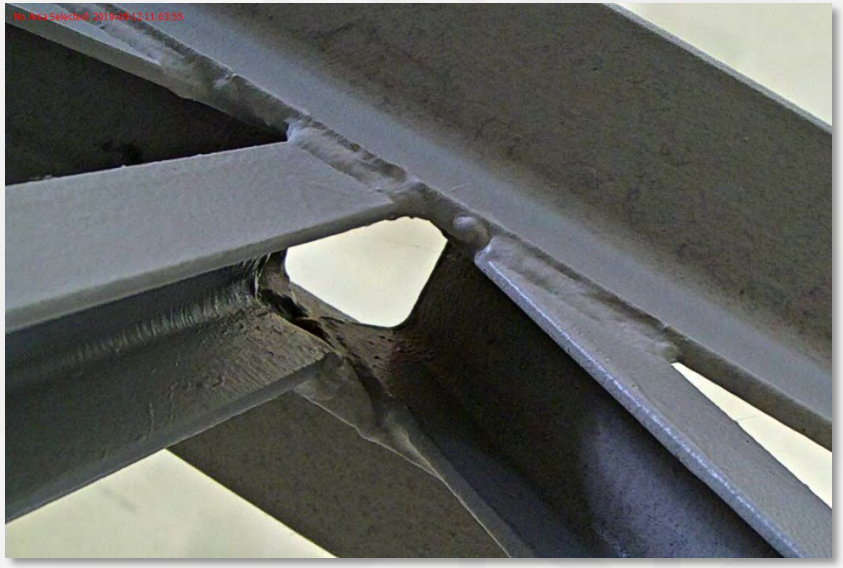
RADCAM Loki

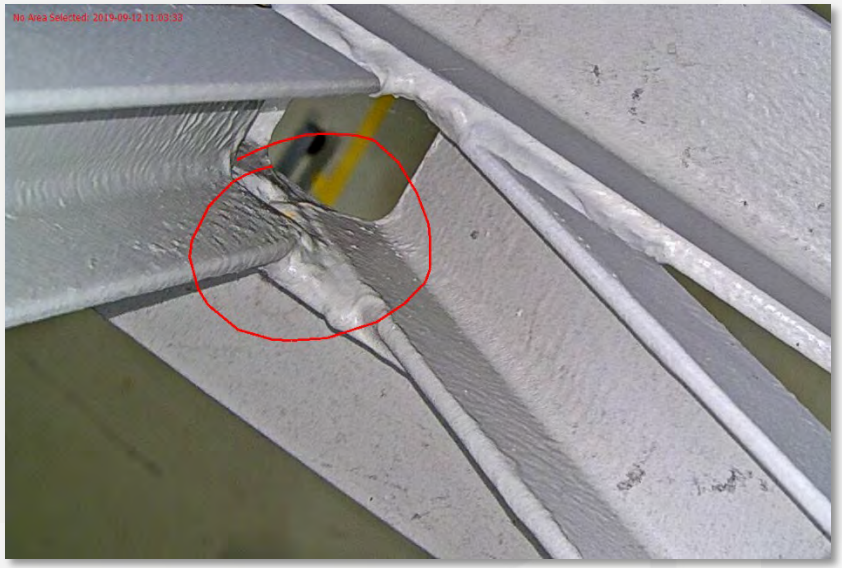
The Innovative Inspection Solution

Loki Interface key features

- **Intuitive & user friendly** interface
- **Ruggedized** 8” tablet
- **Local Wi-Fi** connection (Detachable tablet)
- **Tactile pen** for gloves (or big fingers)
- **Video and Pictures** capture on the fly
- **Edit on the go:** Zoom (digital), draw, reshape, insert text, comment, flag, localize …
- **Record, Trace, Document and Export** your inspection, findings and comments simply by SD card or USB stick.

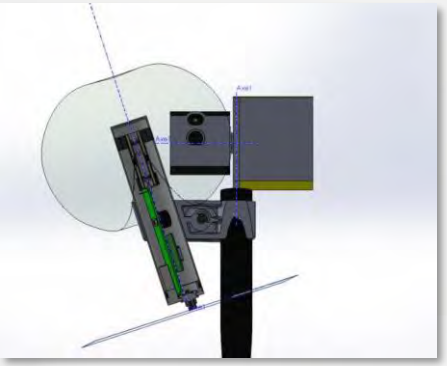






Augmented RADCAM Loki

The Innovative Inspection Solution

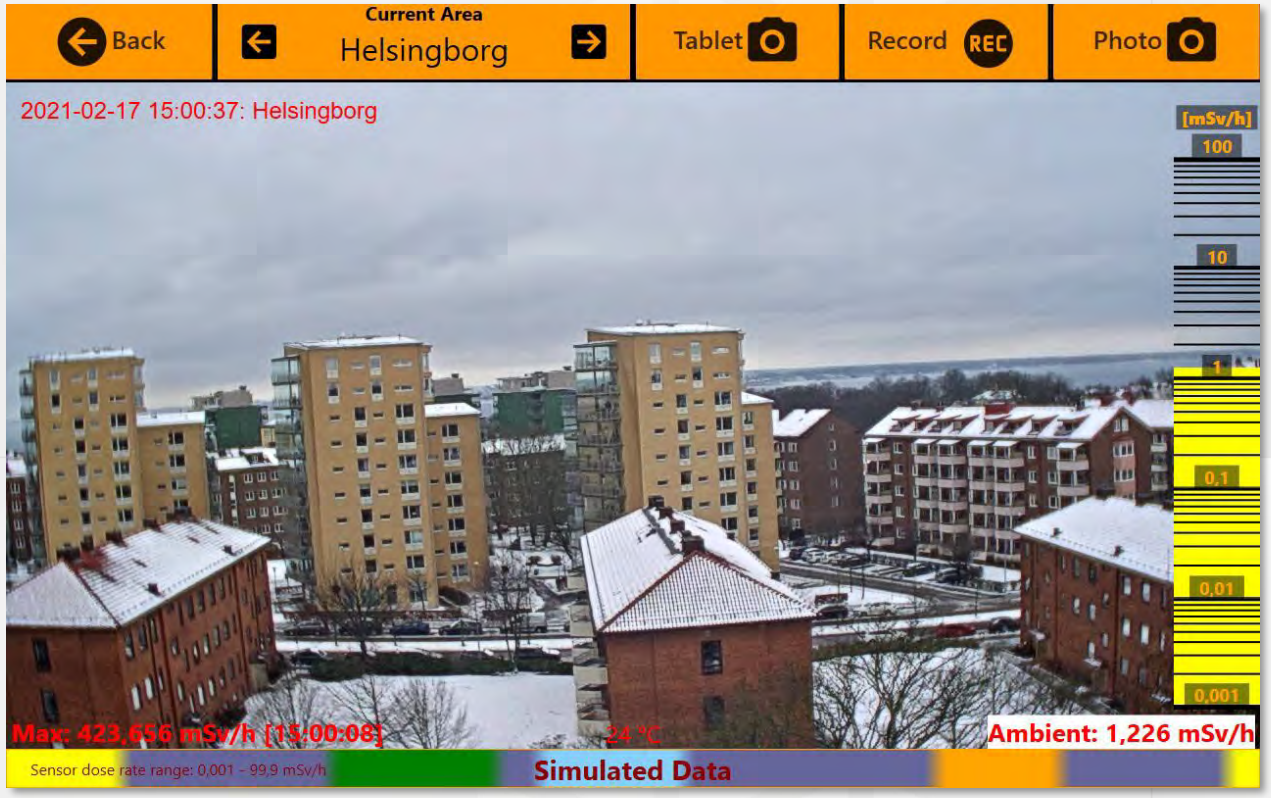


Augmented Loki (Module Kit)

- **Visual & Radiological** data collection in a single operation with a unified tool
- **Simple additional** modulekit
- **Instantaneous dose rate data** (energy compensated GM)
- **Perfect synchronization video / dose rate** for Hot spot search or detailed investigation.
- **Adapted dose rate sensitivity**: 10 µSv/h to 99.9 mSv/h (1mRem/h to 9.99 Rem/h)
- **Unique & valuable Metadata** creation and export to other platforms

Augmented RADCAM Loki

The Innovative Inspection Solution



ISEC
Services & Support

Services & Support

Implementation Support

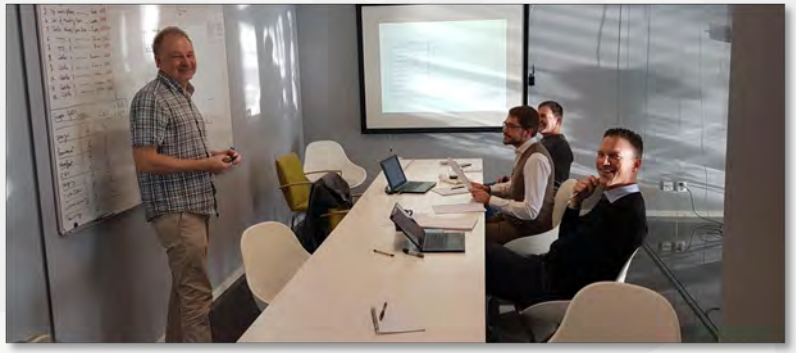
- **Full support for all necessary NPP engineering review including**
  - Full material list
  - Seismic/Structural
  - EMI/RFI Testing
  - Coatings Program
  - Cyber security (firmware)
  - Power
  - Signal Path
  - Mounting
  - Cable Program

- **Supply of all necessary supporting equipment**
  - Mounting arms (roof, wall, floor …)
  - Communication Cables
  - Analog & Digital supervision hardware (Control Racks, VMS, Video matrixes, Video encoders , switches ….)

New Solutions & Innovation

- **Customized and innovative solutions**
  - New product development
  - Product industrialisation
  - Innovation driven R&D roadmap
  - Tailormade Customer solution for Video moni
    Communication inside Containment

- **Continuous Innovation**
  - Improvement of RADCAM modules & control card
  - New version of existing products
  - New product modules development



Questions?

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