ADVANCED X-RAY INSPECTION SYSTEMS

SUSPICIOUS OBJECTS INSPECTION •

MAIL AND PARCELS INSPECTION •

CARGO AND VEHICLE INSPECTION •

RADIATION ALARM SYSTEMS •

BAGGAGE INSPECTION •

TSNK LABORATORY

NORKA is a unique portable X-ray inspection system with a minifocus and microfocus constant potential X-ray source. The voltage can be adjusted from 20 to 160kV. This allows inspecting objects made from different materials with various density and thickness (20-70kV is the optimal voltage for checking mail and thin objects, while 100-160kV works best for baggage and thick objects). One of **NORKA**'s advantages is its ability to inspect areas of an object in fine details using geometric magnification (up to 40 times).

Dual energy option allows recognizing organic and inorganic objects.

The microfocus X-ray unit has a 30-micron focal spot rather than a 1 mm spot used in conventional X-ray systems. In this case resolution attains an unprecedented 25 micron of a copper wire equivalent. Moreover, the distance between an object and the X-ray source can be minimal, down to a few centimeters or even a few millimeters when using geometric magnification.

The images are reproduced on a display screen of the control unit in a positive/ negative form, pseudo colours, with enhanced contrast or in dual energy mode. Zooming in on any of the nine areas of the screen allows better identification. Obtained images can be stored in the control unit memory for further investigation or reference (up to 30,000 images). Stored images can also be edited and provided with additional text, graphics and voice information.

If necessary, these images can be rewritten from the D:\images directory of a "BU-4" control unit to a USB flash drive. Universal power supply (85 - 240 VAC 50/60Hz) allows easy operation anywhere in the world. This is the only system on the market that works from -20°C to +50°C with humidity up to 90%.

The **NORKA** X-ray system is delivered in two handy carrying bags or in one case.
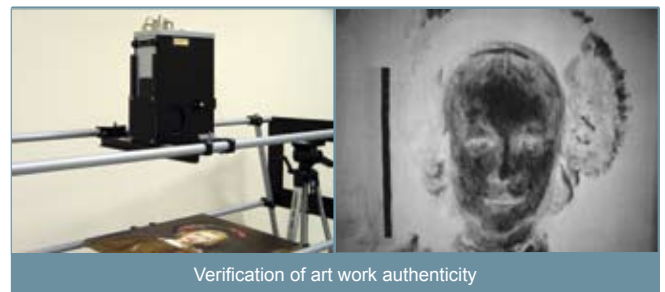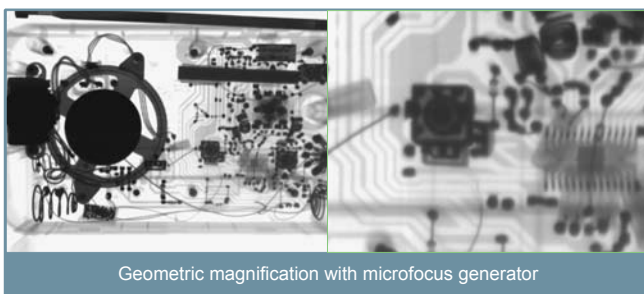
Transport case
with built-in control unit

Application

Dual energy option: suspicious articles (in red)

Verification of art work authenticity

Geometric magnification with microfocus generator

Explosives detection in suspicious objects

NORKA
PORTABLE X-RAY INSPECTION SYSTEM

NORKA has a wide range of applications: customs, law enforcement, airport security and other areas.

It is used for:

- Inspection of mail, parcels and small articles
- Detection of weapons, bombs, wires and explosive devices in various packaging
- Detection of concealed eavesdropping devices in furniture, office equipment, etc.
- Non-destructive testing and evaluation

The **NORKA** X-ray system is easy to use, reliable and completely safe in operation. It provides excellent detecting capability with no harmful effects to its users or service personnel.

System layout

- "BU-4" control unit based on an industrial microprocessor and 12" TFT LCD with touch screen
- "SKB-3D" digital camera unit (1280x1024, 14-bit)
- Interchangeable X-ray converter viewing area: 300x400 mm (standard) with converter unit support. Interchangeable converters (190x250 and 410x550 mm) are available on request
- Specially designed "RE-160" and "RE-120" minifocus X-ray digital generators, "RE-150MN" microfocus and any X-ray unit from the RAP series (constant potential with the voltage up to 300kV)
- Focusing device (optional for microfocus X-ray units)
- Set of connecting cables
- PC mouse & keyboard (optional)
- USB flash drive (optional)
- Rechargeable battery & charging device
- User manual
- Set of transport bags or transport case

General specifications

X -RAY UNIT	RE-160	RE-120	RE-150MN	RAP 220-5
Operation mode	5-25 second exposures in single energy mode			
Max. X-ray tube voltage, kV	160	120	150	220
Focal spot size, μm	800	600	80	2000
Resolution (copper wire), μm	80	60	40	80
Total penetration (Al equivalent), mm	120	65	80	200
Total penetration (Fe equivalent), mm	40	24	20	60

X-RAY IMAGE CONVERTER	
Camera unit	Digital - SKB-3D 1280×1024, 14 bit
Interchangeable converter - screening area, mm	"PR-4" - 190×250
	"PR-5" - 300×400 (standard)
	"PR-6" - 410×550

CONTROL UNIT	"BU-4"
Display	12" colour TFT touch screen display
Memory size (image number)	30 000
Battery life	2 hours, or 60 X-ray image acquisitions
Through-put	60 pictures per hour
Operating temperature	- 20°C to +50°C (-4°F to +122°F)
Relative humidity	90% (35°C / 95°F)
Weight, kg*	less than 29

*Standard system configuration (**NORKA** with RE-150MN)

new converters for NORKA
PORTABLE X-RAY INSPECTION SYSTEM

• BAGGAGE, MAIL & SUSPICIOUS OBJECT INSPECTION •

PR-2432

PPR-4152

PR-2432 and PPR-4664 are portable X-ray converters designed for X-ray nondestructive inspection of baggage, mail, office environment, furniture, building constructions, etc. indoor or outdoor. They can be integrated into the **NORKA** inspection system as well as into other X-ray systems. PR-2432 and PPR-4664 converters effectively detect explosive devices and their components, hidden video/audio recording devices etc. These converters can be used for metal framework flaw detection in field conditions and also for inspection of large size objects which, due to their construction profile, can not be scanned by stationary X-ray systems.

All converters have built-in rechargeable battery and can work while being charged. The control command and data transmission are carried out by Wi-Fi or cable.

The main feature of the PPR-4664 converter is its scanning linear detector.

PPR-4664 converter scanned images

General specifications

	PPR-4664	PR-2432
Operating area (W x H), mm	460 x 640	240 x 320
Converter type	scanning	matrix
Detector pitch, mm	0,8 or 0,4 or 0,2*	-
Digitizing depth, bit	16	16
Through-put, pictures per min	4	12
Wireless communication range, m	up to 50	up to 50
Wire detection (copper wire), mm	0,1	0,06
Spatial resolution, Lp/mm	up to 2,5	2,7
Weight, kg	7	4,6
Dimensions (L x H x W), mm	680 x 420 x 35(55)	340 x 340 x 160

* Standard size 0,8 can be optimized according to the customer's needs (0,4 and 0,2 detector pitch)

Kalan-2M
OFFICE X-RAY INSPECTION SYSTEM

KALAN-2M is used for the X-ray inspection of mail, baggage, office equipment, etc. to detect explosives, weapons or electronic bugs. Due to its solid construction and implemented safety features, **KALAN-2M** is safe to operate in any office environment and at any security checkpoint.

X-ray generator

A microfocus or minifocus X-ray tube allows detecting very thin objects such as wires and detonation devices components. The **KALAN-2M** specially designed X-ray generators contribute to its overall small dimensions. Adjustable voltage allows inspection of objects with various thickness and density.

Dual energy option allows recognizing organic and inorganic objects.

Processing unit

KALAN-2M features a versatile image processing unit capable of saving up to 30,000 images accompanied by voice and text comments.

Design

As an office X-ray inspection system it has small overall dimensions, modern design and fits perfectly into office interiors. It is supplied with a mobile base and can be moved around by one person.

All basic operation functions of **KALAN-2M** are carried out from the remote control unit. A high contrast, high resolution display shows images with unparalleled accuracy.

The chamber for testing objects is supplied with an adjustable tray. By precisely positioning an object, using the **KALAN-2M** movable tray, high resolution magnifications up to 12 times can be achieved (only with a microfocus X-ray unit).

B/w image and image in dual energy mode of the same bag

General specifications

Max. object size (W x H x L)	440 × 520 × 550 mm
Max. object weight	30 kg
Penetration Fe/Al equivalent	16/70 mm
Wire detection/with 8x geometric magnification (only for microfocus X-ray unit)	0,08/0,02 mm
Through-put	up to 120 images per hour
Radiation leakage	less than 1,0 µSv/h

X-RAY GENERATOR	
X-ray tube voltage settings for microfocus/minifocus X-ray units	30-100/45-120 kV
Tube current (typical) for microfocus/minifocus X-ray units	0,1/0,5 mA
Operating temperature (Relative humidity)	+5°C to +40°C (80% at 25°C)
Power	110/220 V
Power consumption	180 W
Dimensions (W x H)	610 × 1380 mm
Weight	275 kg

XR-PSCAN-2611
MAIL AND PARCELS DESKTOP X-RAY INSPECTION SYSTEM

The number of terrorist and criminal attacks using letter bombs and toxic powders has substantially increased over the last few years. Only a comprehensive inspection of incoming mail by applying appropriate technology can ensure our safety.

The **XR-PSCAN-2611** X-ray inspection system is designed for daily inspection of incoming correspondence (mail and small packages). It can detect explosive devices and their components, narcotics, radioactive substances, toxic powders (dusts), such as anthrax, metal and plastic weapons.

On its monitor **XR-PSCAN-2611** displays b/w or coloured X-ray images of the inspected objects created by a U-shaped multi-detector. This type detector guarantees the absence of «dead zones» in inspected objects. Adjustable voltage allows detecting small quantities of substances of various densities. Additionally, the internal gamma-detector makes it possible to expose radioactive substances.

XR-PSCAN-2611 is the smallest and most compact X-ray scanner featuring high resolution colour image processing, adjustable voltage and a U-shaped multi-detector. With dimensions and weight comparable to desktop photocopiers, the **XR-PSCAN-2611** X-ray inspection system can be easily integrated into any office environment.

Applications

The **XR-PSCAN-2611** X-ray inspection system is intended for use by government and law enforcement agencies, the military, private security companies, banks, at commercial premises, television/broadcasting studios, publishing houses, judicial and correctional facilities and other security sensitive areas.

Mobile phones

Telephone, explosives components, pistol

General specifications

Max. object size (W x H x L)	352 × 252 × 100 mm
Max. object weight	5 kg
Wire detection	⌀ 0.08 mm
Radiation leakage	0,5 μSv/h
X -RAY GENERATOR	
Anode voltage	30 - 70 kV
Tube current (typical)	0,05 mA
Levels of brightness	65 000
Operating/storage temperature	-10 °C to +45°C/-40° C to +60°C
Power	85 - 245 V
Power consumption (without monitor)	70 W
Dimensions	800 × 410 × 310 mm
Weight	35 kg

Portal-Beta

## CARGO AND VEHICLES X-RAY INSPECTION SYSTEM

PORTAL-BETA is a rail-mounted gantry X-ray cargo inspection system designed for the inspection of sealed sea freight containers, consignments inside trucks and other vehicles. It can detect smuggled goods, including plastic weapons and explosives, drugs, radioactive materials. The main system components are the X-ray generator, which produces high energy X-ray beam, and the highly sensitive L-shaped detector. The **PORTAL-BETA** X-ray system combines powerful penetration and low radiation dosage. The system is normally placed in a temperature controlled permanent or solid build infrastructure and can operate 24/7. The system automatically inspects vacated vehicles placed between the rails (the gantry moves over them).

Images are transmitted to the remote control room for further examination **PORTAL-BETA** is ideally suited for applications at customs facilities, sea and airports, border crossings. The system configuration allows fast and thorough inspection up to 40 vehicles/trucks per hour. The **PORTAL-BETA** X-ray inspection system meets all international health and safety requirements.

System layout:

- Temperature controlled infrastructure
- X-ray generator (betatron)
- L-shaped detector unit
- Control unit
- Transportation unit

Image of the incpected car
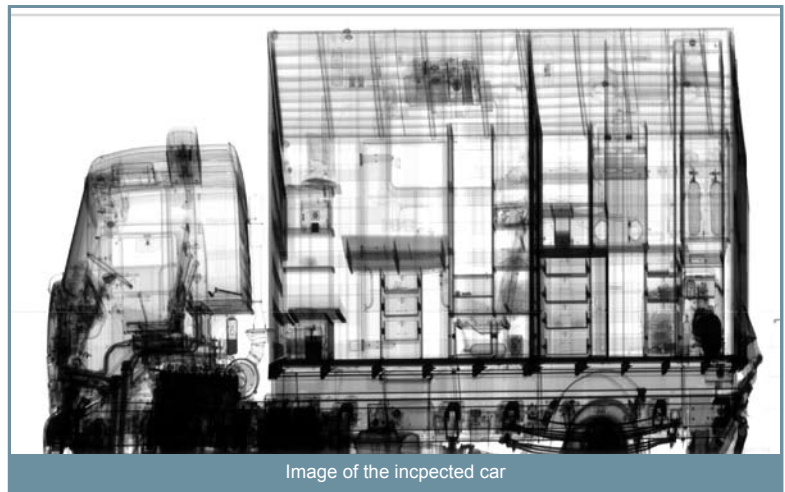
General specifications

Inspected object dimensions (W x H x L)	3 x 4 x 30 m*
Radiation dosage	less than 500 µSv per scan
Through-put	up to 40 vehicles/trucks per hour
Scan speed	40 cm/s
X-ray generator energy	7 - 9 MeV
Detector	L-shaped one dimensional
Image	black and white (65 000 levels of grey) or pseudo color
Detector element size	5,0 × 5,0 mm
Inspection sensitivity	2% (up to 300 mm of steel)
Penetration	350-400 mm of steel
Visual and processing means	computers with several high resolution TFT displays and a special image and data storage system
Digital image processing	Image storage, magnification up to 16 times, sharp and contrast enhancement, filtering, segmentation
Power	built-in generator or three-phase AC power circuit 380V/50Hz
Power consumption	16 kW
Operating temperature/Humidity	-35°C to +45°C/up to 90%

* Can be optimized according to the customer's needs

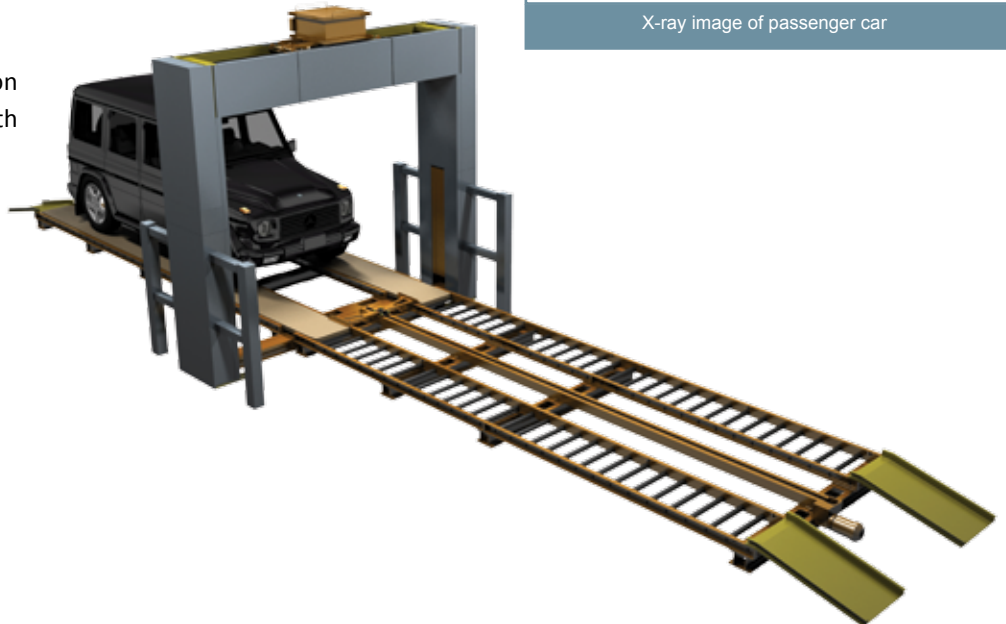# Portal-Auto
SUV AND VEHICLE X-RAY INSPECTION SYSTEM

PORTAL-AUTO is a drive-through gantry vehicle screening system designed for the inspection of illegal consignments inside vehicles, large size pallets etc. It can detect smuggled goods, including plastic weapons and explosives, drugs, radioactive materials. The main components of the system are the X-ray generator, which produces high energy X-ray beam, and a highly sensitive U-shaped detector. The **PORTAL-AUTO** system combines high penetration and low radiation dosage. The system can be integrated not only in a temperature controlled permanent or solid built infrastructure but, uniquely, in a 20ft. container or a tent, and is intended to work 24/7. The system automatically inspects vacated vehicles placed on a vehicle moving system. Images are transmitted to the remote control room for further examination. Due to its mobility, if set up in a 20ft. container, **PORTAL-AUTO** is ideally suited to work at border crossings, security checkpoints, as well as at maritime ports and airports, security sensitive areas such as goverment/ commercial sites, military and law enforcement HQs/structures.

The **PORTAL-AUTO** X-ray inspection system meets all international health and safety requirements.

X-ray image of passenger car

System layout:
- Temperature controlled environment
- X-ray generator
- U-shaped detector unit
- Data collection and processing systems
- Vehicle moving system

General specifications

Inspected object dimensions (W x H x L)	2300 x 2184 x 12000 mm*
Through-put	up to 10 vehicles/objects per hour
X-ray generator	specially designed X-ray generator 300 kV/5mA*
Detector	U-shaped one dimensional
Image details	black and white (65 000 levels of grey) or pseudo color
Detector element size	1,6 x 1,6 mm*
Inspection sensitivity	2% (up to 30 mm of steel)*
Visual means	dual monitor PC with DVD/CD writer
Digital image processing	image storage, magnification up to 16 times, sharp and contrast enhancement, filtering, segmentation
Power	built-in generator or 85 - 240VAC 50/60Hz
Power consumption	3,5 kW
Operating temperature/Humidity	− 10°C to + 45°C/up to 90%

* Can be optimized according to the customer's needs

TS-SCAN 5280

BAGGAGE INSPECTION SYSTEM

TS-SCAN 5280 is a baggage X-ray inspection system. The dual energy technology provides automatic colour coding of materials according to their effective atomic numbers. **TS-SCAN 5280** has a low conveyor belt for ease of loading/offloading of upright baggage and a small footprint.

Image processing features: material separation colour display, pseudo colour, black and white image, positive/negative, contrast manipulation, edge enhancement, organic/inorganic stripping, high/low penetration, high density alert.

Image display features: image review, variable zoom up to 16x.

Additional features: baggage counter, data and time display.

TS-SCAN 5280 meets all international health and safety requirements.

Scanned image
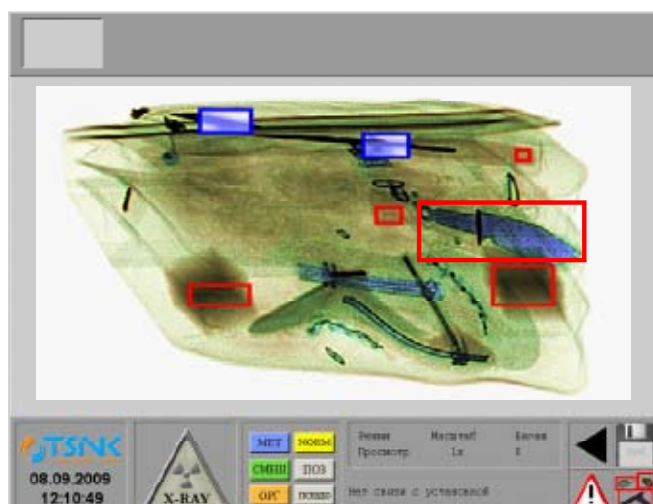
General specifications

Tunnel size (W x H)	520 x 800 mm
Max. object size (W x H)	508 x 788 mm
Conveyor height	275 mm
Conveyor speed	0,2 m/s
Max. object weight	160 kg
Resolution (wire detection measured by Cu wire)	38 AWG (0,1 mm)
Penetration (steel)	27 mm
Radiation dosage	0,8 µSv
Film safety	guaranteed up to ISO 1600 (33 DIN)
Number of views	1
Power consumption	0,8 kW
Dimensions (L x W x H)	3090 x 1452 x 1195 mm
Weight	800 kg

TS-SCAN 6040
BAGGAGE INSPECTION SYSTEM
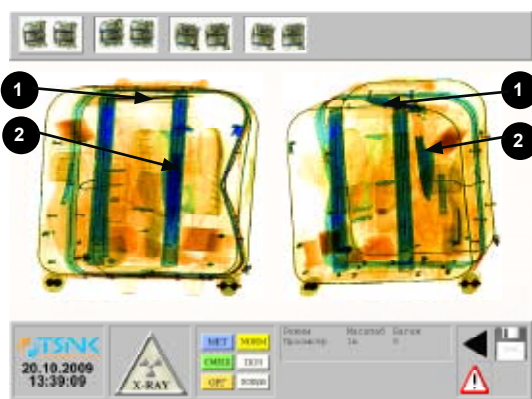
TS-SCAN 6040 is a multi-view X-ray inspection system. The baggage views provide its complete perspective regardless of its positioning in the X-ray system. Multi-view technology eliminates the need for operators to reposition and re-scan the baggage.

The multi-view system eliminates any possibility of deliberate concealment of prohibited articles in carry-on baggage. A knife is visible at least at one of four views (projections), regardless of its position in the baggage (see second picture on the left).

The dual energy technology provides automatic colour coding of materials according to their effective atomic numbers. **TS-SCAN 6040** has a large industry standard tunnel opening of 600 mm wide and 400 mm high.

Image processing features: material separation colour display, pseudo colour, black and white image, positive/negative, contrast manipulation, edge enhancement, organic/inorganic stripping, high/low penetration, high density alert.
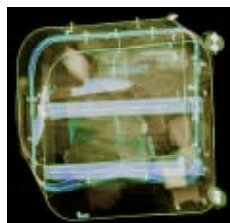
Image display features: image review, variable zoom up to 16x, view change.

Additional features: baggage counter, data and time display, all views simultaneous preview.

TS-SCAN 6040 meets all international health and safety requirements.

1, 2 - ceramic knives

"Metal"　　　"Negative"　　　"Organics"　　　"Inorganics"

General specifications

Tunnel size (W x H)	600 x 400 mm
Max. object size (W x H)	590 x 390 mm
Conveyor height	800 mm
Conveyor speed	0,2 m/s
Max. object weight	160 kg
Resolution (wire detection measured by Cu wire)	38 AWG (0,1 mm)
Penetration (steel)	27 mm
Film safety	guaranteed up to ISO 1600 (33 DIN)
Number of X-ray generators*	2 or 1
Anode voltage	140 kV cp
Number of views*	4, 3 or 2
Detectors	L-shaped
Power consumption	1,4 kW
Dimensions (L x W x H)	2685 x 950 x 1462 mm
Weight	1100 kg

* Can be optimized according to the customer's needs

Rate meters

The 2-channel alarm radiometer **NPS-32** can continually measure X-ray and γ-ray radiation. It has a light and sound alarm, which alerts operator, if the radiation dose exceeds the automatically preset threshold. Once the device is on, it takes about one minute to calculate the threshold, which is equal to the average radiation dosage, plus five standard deviations.

This radiometer can be positioned around doors or gates in order to detect any trace of radioactive material.

NPS-32 can be supplied with a fast scintillation detector for inside use or by a detector with H-M counters and is perfect for adverse weather conditions (high humidity and extreme temperatures).

PSD-8 is an 8-channel alarm radiometer with the same features as **NPS-32**. By connecting it to a PC, it can serve as a valuable addition to any integrated safety system.

Searching radiometer **SR-5** is intended for measuring γ-ray radiation dosage. It can be used to find and identify the radiation source and determine the radiation leakage.

The detector (scintillation crystal in combination with PM) provides very short exposure time and, consequently, very fast and effective detection of radioactive sources.

SR-5 provides numeric values of radiation dosage, linear and logarithmic scales and produces audio alarm using different frequencies.

SR-5 is powered by a rechargeable battery. The device can calculate and display not only the radiation dose in a given area but also the dose received by an operator.

OREL
MICROELECTRONIC DEVICE INSPECTION SYSTEM

The stationary testing system "OREL" is designed for technological inspection of microelectronic devices. Specifically, it allows for detection of defects in radioelectronic units.

"OREL" can be used for inspection systems, inspection of multilayer PCB layout, quality control of BGA and µBGA mounting.

The 3D-CT system is an advanced version of "OREL".
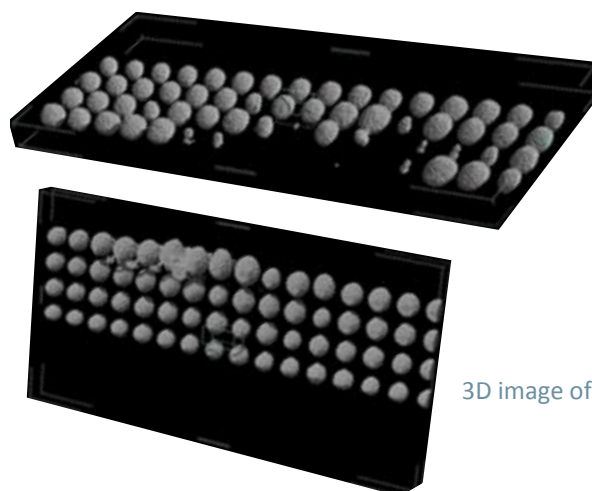
3D image of BGA
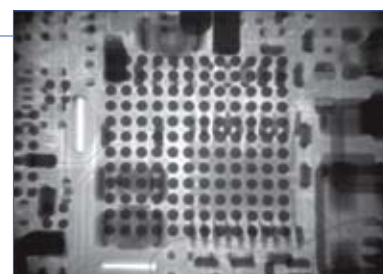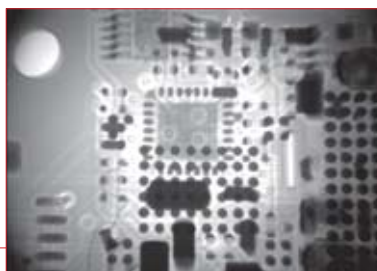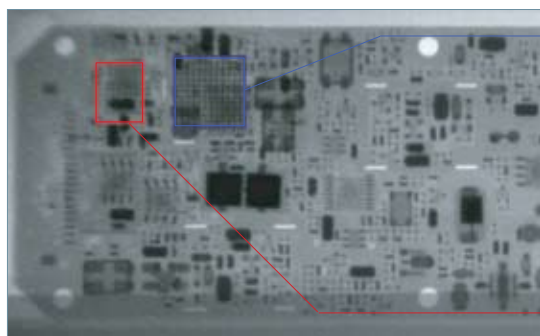
Magnified areas of an object

General specifications

Geometric magnification	up to 2000 times
Max. sample size	500×500 mm
Resolution	10 micron
High voltage range	20 ÷ 150 kV
Anode current range	60 ÷ 120 mkA
Control mode	automatic / manual
Converter screen size	300×400 mm
Focusing system	automatic electromagnetic
System dimensions , mm	1331×1306×1910 mm
System weight	1325 kg

RAP series
PORTABLE X-RAY UNITS
• NON-DESTRUCTIVE TESTING •

The **RAP** X-ray units are designed for mobile use. They are compact and lightweight. The X-ray units have a long-term output radiation stability, high-frequency anode voltage supply and a microprocessor internal control.

The **RAP** X-ray unit is comprised of three components: an X-ray generator, a power supply unit and a remote control unit.

The X-ray generator is uniquely designed, easy to use and very reliable. No additional cooling is required. The **RAP-90** X-ray generator weighs only 4,7 kg. It is the smallest one of its kind on the current market.

The power supply unit is also very light and has low power consumption. It is designed to work from any power source within 110-127/200-250VAC, 50/60Hz .

The remote control unit is microprocessor controlled and housed in a small, rugged, splash proof casing. The high contrast backlit LCD screen displays voltage (kV), tube current (mA), exposure time (recording time and time remaining) and temperature of the X-ray unit. With the remote control unit you can easily adjust voltage (1kV increments), tube current (0,1mA increments) and exposure time from 0 to 9999 seconds in one second increments. If necessary, the distance between the remote control unit and the X-ray unit can be more than 100 meters.

X-ray unit mounted on special tripod

WHAT ARE THE ADVANTAGES?

Our portable X-ray units are very durable and can withstand most mechanical impact due to the use of oil insulation. The RAP unit needs only 10 minutes or less to warm-up even after prolonged inactivity. Our unique anode supply technology extends the life of the X-ray tubes up to 4000 hours.

General specifications:

	RAP 90-5	RAP 100-10 (RAP 100P-10)*	RAP 160-5	RAP 190P-5*	RAP 200-5	RAP 220-5	RAP 300-5
Maximum anode voltage/current, kV/mA	90/5	100/10	160/5	190/5	200/5	220/5	300/5
Maximum penetration thickness Fe/concrete, mm**	7/90	9/110	25/160	27/-	32/220	47/250	60/300
Adjustable range voltage/current, kV/mA	30 - 90 0,2 - 5.0	10 - 100 0,5 - 10,0	40 - 160 0,4 - 5,0	150 - 190 4,0 - 5,0	80 - 200 1,0 - 5,0	50 - 220 0,3 - 5,0	70 - 300 0,7 - 5,0
Radiation dose at 0,5 m from target, roentgen/min	8.8	200 (60)	14	4	25	26	60
Focal spot size, mm	1,2 × 1,2	1,1 × 1,1 (4,0 × 1,2)	1,2 × 1,2	3,5 × 1,5	2,0 × 2,2	2,0 × 2,0	2,5 × 2,5
Weight of X-ray generator/control unit, kg	4,3/5,1	8,8/8,5	14/8	20/6,3	16/6,3	29,5/10,5	37/10,5

* Panoramic X-ray output

** X-ray image conditions: F=700 mm, D_{optic}=2.0, X-ray film D7 (R7) with 27 µm plumbum screens