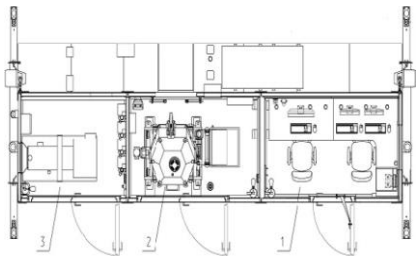
Relocatable Entire Truck and Cargo X-Ray Scanning System

Product Code: 1050-04

Key Features

- **Relocatable, Rapid Deployable**
- **Safely Scans Entire Vehicle**
- **Contraband Detection & Manifest Checking**
- **Drive Through Operation**
- **Up to 100 Vehicles Per Hour Throughput**



3 Diesel Electrical Generator 2 X-ray Source 1 Control room

Overview

The Relocatable Entire Truck and Cargo X-Ray Scanning System is a rapid deployable drive through state-of-the-art dual energy X-ray scanner for checking cargo compliance to manifest documentation and the detection of contraband, explosives, narcotics and weapons etc.

The system has its own control room and electrical generator making it a complete stand-alone solution, it can also use local shore power.

It can safely scan an entire vehicle including the truck cab with the driver present or just the cargo area of a vehicle or sea freight container, with a typical throughput of up to 100 vehicles per hour.

The system is transported to site on a flat bed truck trailer, it is then lowered by using its jacks.

From arrival on site, using a trained team the system can be operational typically within 30 minutes.

Features

- Rapid deployable
- Complete stand alone solution
- Up and running <30 minutes
- Drive through operation
- Up to 100 vehicles per hour

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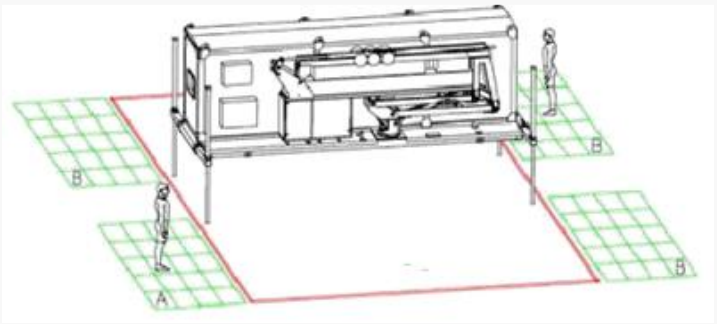
Applications

The Relocatable Entire Truck and Cargo X-Ray Scanning System is an ideal solution for the detection of hidden contraband, such as smuggled goods, explosives, narcotics, weapons, persons, animals and the checking of the carried cargo to manifest documentation at Airports, Border check points, Government facilities, Hotels, Military bases, Seaports, Sporting events, Temporary check points & VIP facilities etc.

System Deployment

The system is transported to the intended inspection site by a truck with a flatbed trailer

Note: The truck and trailer is not provided, this is the customers responsibility.



On arrival at the vehicle inspection location jacking legs are extended, the trailer is removed and the jacking legs lower the system to the ground.

System deployed ready to use

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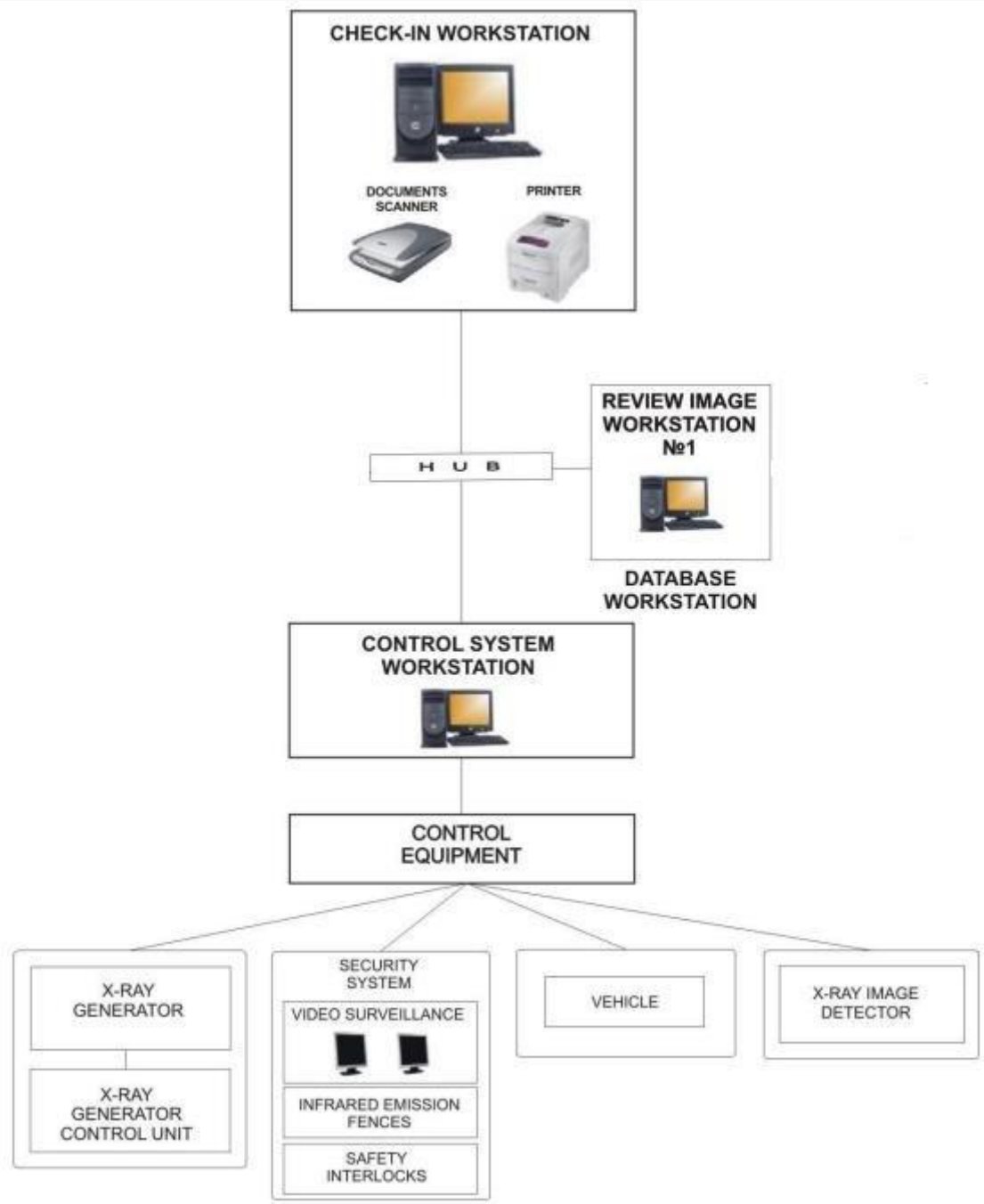
Control System Schematic



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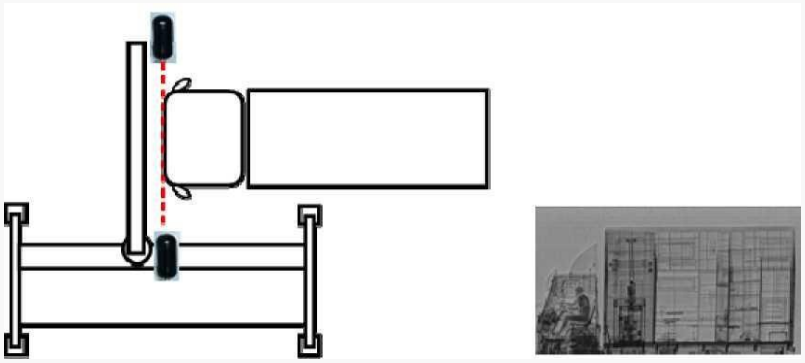
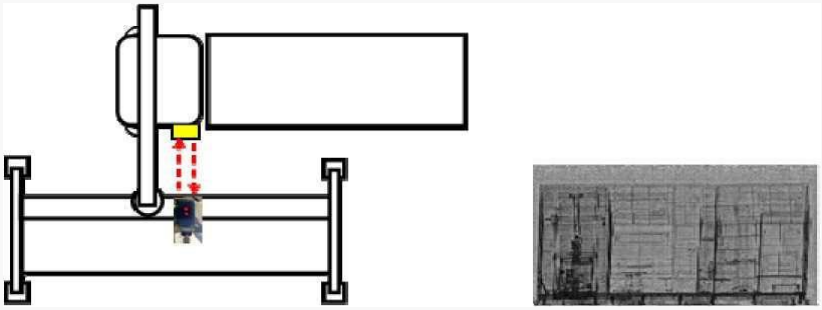
Safely Scanning Truck Cab & Scanning Cargo Area

The x-ray scanning of the truck cab is activated after an infrared beam is broken by the front of the cab, this initiates the x-ray scanning of the cab.



A special reflector is placed on the side truck cab at its rear, an Infrared emitter beam is targeted in the area of the reflector as per the diagram below, when a receiver detects the beam, this activates the x-ray scanning of the cargo area as it passes through the scanner. When the cargo area has completed passing through the scanner the x-ray system is shut down.



Generator & Operators Room

Diesel Generator

A diesel power generator located in a separate compartment of the system this provides power in the advent that local shore power is not available.

Operators Compartment

The operator's compartment is provided with air conditioning and heating to maintain an optimum working temperature for the comfort of the operators. The operator's area contains the control systems to operate the x-ray scanning system and monitor its operation, including reviewing the scanned images of the vehicles for contraband and checking the actual contents of the vehicle to its manifest listing. The control system consists of: -

- Check-in workstation together with a Manifest Scanner
- System control workstation
- Review image workstations together with an Image Printer Unit
- Database workstation (Server) for storing and administering access to images
- Control software.

All the workstations are contained within a secure local network with connection capability to external networks

Option - Remote Review Image Workstation , provides safe remote access to the server data is available

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Intercom System & Traffic Lights

Intercom System

An intercom system is included with the system, the master station is in the operator's compartment, other intercom units are in the radiation source and the diesel generator areas.

Two short wave portable units are provided for communications between the operator's compartment and the traffic control marshal.

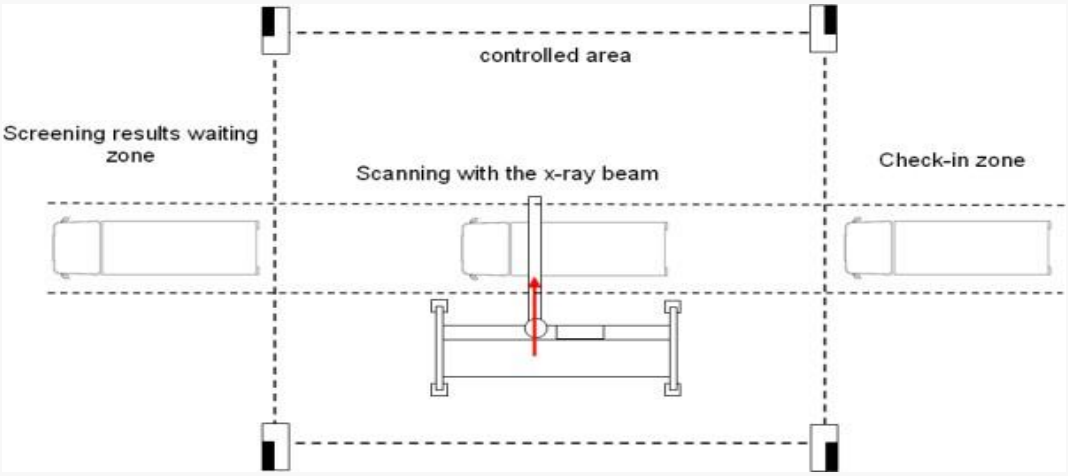
Traffic Lights

Traffic Lights placed on container side panels are used for controlling the vehicle movement through the radiation portal. A green light signals the vehicle driver to enter the scanning area.

Screening Process

The vehicle screening procedure consists of several stages:-

- The vehicle drives into the registration zone, his manifest detail is inspected
- The vehicle scanning takes place, the operators receive the scanned image
- The driver is instructed to proceed to the waiting area
- Depending on the operator's analysis of the vehicle image the driver is instructed to drive on or to proceed to an inspection area for further inspection



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Software – X-Ray Image Acquisition, Processing, Analysing & Archiving

- Adjusting the intensity scale over the whole image or in the window
- Automatic acquisition of data from the X-ray detector
- Brightness and contrast adjustment
- Counting the inspection objects
- Dual-energy imaging – an automatic colour coding for materials separation (3 colours) feature allowing distinguishing between organic, non-organic and metal materials
- Enhancing the boundaries and pre-setting the boundary sharpness
- Enhancing the contrast
- Entering and storing the information about the operator
- Image inversion
- Image scrolling
- Instrument for measuring linear distances
- Marking suspicious objects with comments
- Pre-setting the brightness and contrast for heavy and weak absorbing objects,
- Printing-out the images or a selected portion, pictures, comments and accompanying documents on separate sheets
- Pseudo colouring according to the density with the possibility of selection of colour palettes
- Pseudo relief
- Scanning the manifest and saving the same together with the image
- Step-by-step (ZOOM from 2 up to 32) and smooth zoom.
- Supporting different image formats, designer's original format, BMP, JPEG
- Visualisation of the date and time
- Visualisation of the image in real time

Radiation Safety

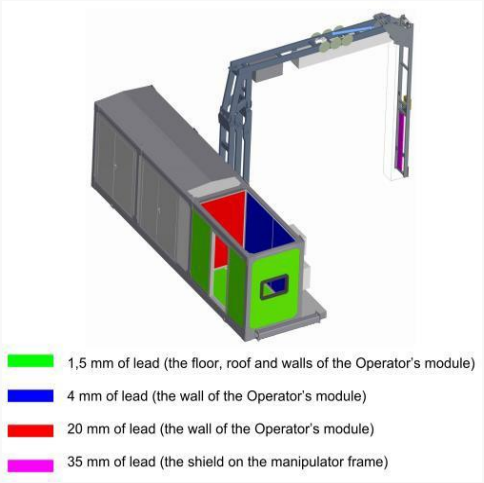
The radiation safety system ensures the safety of the people within and outside the controlled area including the system operators, drivers and public. The boundaries of the controlled area of the system are based on the ionising radiation dose outside the controlled area not exceeding a value of 0.5 µSv on average in any one hour of system operation.

And the total accumulated annual dose not exceeding the permissible limit of 1 mSv (ICRP 2007), provided that no person is exposed to radiation more than 2,000 hours during a year (standard duty schedule).

The radiation protection outside the controlled area is achieved by cordoning off the controlled area and positioning infrared sensors around the perimeter to detect persons entering the area, this will set off alerts and shut the x-ray system down.

The perimeter of the controlled area is determined by maximum allowed limit of dose for one hour of system operation that a person standing outside this area limits may receive during system operation.

The controlled area dimensions in the direction the vehicles are travelling should not be less than their length to ensure maximum safe and optimum system performance



Lead Shielding

Permanent Radiation Protection Walling
The system can be installed within permanent radiation protection walling, this will significantly reduce the overall footprint of the operating area.

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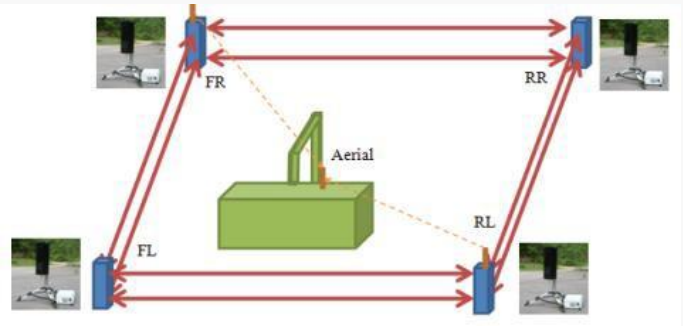
Infrared Safety Barriers

The radiation restricted safety area perimeter is protected from intrusion by active infrared barriers that communicate by wireless with the operator's compartment.

If somebody crosses the area perimeter x-radiation is switched off and corresponding information appears on the display of the scanner control system to be read by the operator



Infrared Safety Barriers

Video Surveillance & Safety Systems

Video Surveillance System

The controlled area is additionally monitored by video cameras located on the container and on the manipulator, the four cameras are monitored in the operator's compartment on one LCD display. One camera is located on the manipulator display providing images of the controlled area, three cameras are located on the system container proving images of the scanning area.

Emergency Stop Buttons

Emergency stop buttons are in the operator's compartment and externally on the container, when pushed the x-ray screening process will immediately stop, relative information will appear on the operators display.

Light and Acoustic Signals

Audio (siren) and a light strobe are mounted externally on the system container, they activate on the start-up of the x-ray system and during its screening process. In the operators compartment a radiation monitor is mounted on the celling, when activated an audio-visual alarm is activated.

Dose Rate Monitoring Device

A portable dosimeter is in the operator's compartment, if the predetermined allowed limit of x-ray radiation dose rate is exceeded, it will trigger visual and audio alarm signals, simultaneously the scanner safety system automatically switches off the x-ray generation.

Safety Interlocks

The entrance door of the radiation source module is provided with a magnetic safety interlock, a further interlock is mounted on the radiation source cover that provides access to the accelerator.

Vehicle Presence Sensors

Reflective sensors are used to control the vehicle and the cargo position relative to the scanner to ensure maximum radiation safety of the driver. The sensors permit high level x-ray generation only when the driver's cabin has left the area of the scanning beam. The moment when the sensor registers the reflective mark is visually displayed on the display screen of the system operator.

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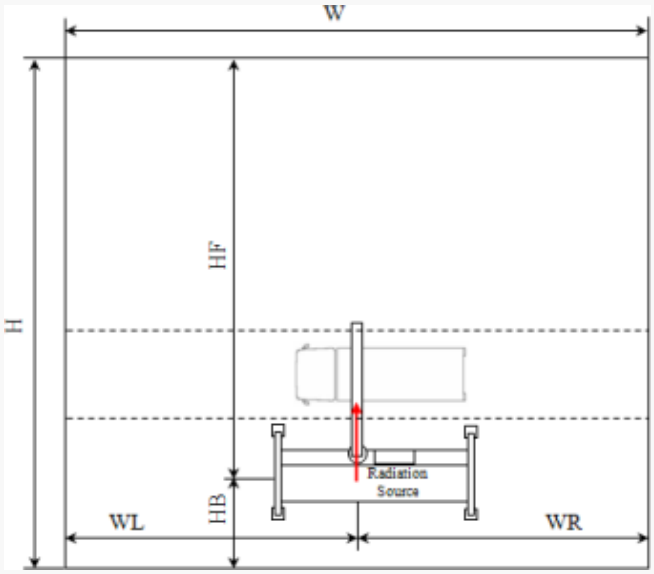
Controlled Area

Recommended dimensions of the controlled area:–



Maximum length of vehicles	Dose for 1 hour of system work at the area's border	H- metres	W - metres	HF - metres	HB - metres	WL-WR metres
25	<0.5 µSv	28	60	23	5	30
20	<0.5 µSv	28	50	23	5	25
15	<0.5 µSv	28	40	23	5	20
10 and less	<0.5 µSv	28	30*	23	5	15

According to radiation safety requirements the minimum area width must not be less than 18m

The radiation safety system comprises: –

- Dose rate monitoring device
- Emergency stop buttons
- Infrared barriers
- Intercom system
- Light and acoustic signals
- Radiation protective shielding
- Safety interlocks
- Traffic lights
- Vehicle presence sensors
- Video surveillance system

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Specifications

Environment

Operating Ambient Temperature range	- 20ºC to 40ºC
Operating Air Humidity Range	80% at +25ºC
Transportation Temperature Range	- 20ºC to 55ºC
Transportation & Storage Air Humidity Range	80% at +25ºC

Power Supply

Local Shore Power	400v 3 Phase 50 /60 Hz
Maximum Power Consumption	20 KVA
Diesel Generator Rating	24 hour continuous

General

Cargo Inspection Technology	Drive thru portal – The vehicle drives through the portal.
Maximum Dimension of Scanned Vehicle / Object	Width 3 m x Height 4.4 m x Length 25 m
Dimension of Inspection Tunnel	Width 3.98 m x Height 4.5 m
Beam Shape	Vertical fan shaped
Scanning Speed	5 to 10 km/h
Set up time	Less than 30 minutes

X-Ray Source

Source	Betatron MIVB 7.5 Mev
Nominal Energy	7.5 / 5.0 Mev
Focal Spot	0.3x3 mm

X-Ray Image Detector

Detector Type	Monoenergetic Led scintillator
Detector X-Ray Sensitive Element Pixel Size	4.6 mm

Image Quality

Penetration Steel	320 mm
Wire Resolution (copper wire)	2 mm
Spatial Resolution	4 mm

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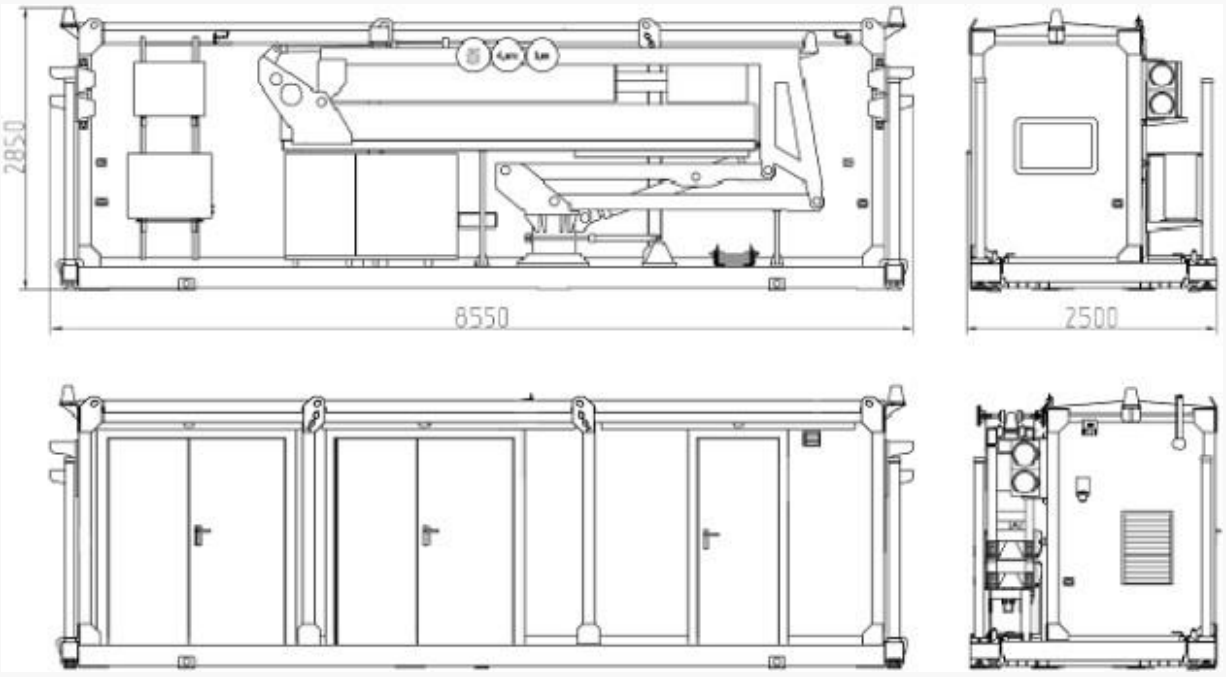
Specifications

Radiation Safety

Dose for Personal	<0.5 µSv/h <1 mSv/year
Driver Dose if Cab is NOT Scanned	<0.02 µSv for one scanning procedure
Driver Dose if Cab is Scanned	< 0.6 µSv for one scanning procedure
Dose rate Outside Controlled Area 28m x 60m	< 0.5 µSv for 1 hour of system operation <1 mSv/year
Size of Controlled Area in Compliance with ICRP60	≤ W28m x ≤ L60m for 0.5 µSv/h per average hour of operation

Dimensions & Weights

Dimensions in Operating Position	Length 8.85m x Width 8.6m x Height 5.26m
Dimensions in Travelling Position	Length 8.85m x Width 2.5m x Height 2.85m
Footprint in Operating Position Without Controlled Area	Length 9m x Width 9m
Overall System Weight	14,000 kgs