

Rapiscan
systems

AS&E[®]



AS&E's MINI Z for Correctional Facilities

June 2017

INTRODUCING MINI Z™

Handheld Z Backscatter[®] Screening System

The world's first handheld Z Backscatter screening system that delivers fast, real-time images to detect drugs, currency, plastic weapons and contraband, in hard-to-reach locations.



MINI Z™ On-the-Go Detection

Z Backscatter technology in the palm of your hands

- Using AS&E's signature Z Backscatter technology, the MINI Z produces a real-time image of the scan target, highlighting organic materials, such as plastic weapons and drugs

Goes where other systems can't reach

- Compact imager that can be used to scan objects in space-constrained areas, such as:
 - ▶ Mattresses and inmates' personal items in cells
- Single-sided imager that can be used to scan objects that cannot be scanned by traditional X-ray systems, such as:
 - ▶ Walls and furniture



MINI Z Easy-to-Use

Completely self-contained

- Does not require physical set-up, enabling immediate operation
- Battery operated, wireless communications (Wi-Fi)
- Intuitive operation: as an operator scans a target, an image appears in real-time on the system's dedicated tablet



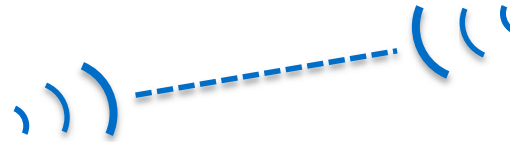
Tablet-based interface provides simple operation

- Provides simple operation and management of the scan data
- Contains suite of tools for enhancing and analyzing images
- Training materials accessed through the home screen help icon

MINI Z System Components



Scanner Module



Communication Link
Wireless (Wi-Fi) &
Wired



Tablet PC w/ASEInspection Software
for Scan Image Viewing



Two scanner batteries
(one in use, one spare)



Battery Charger



Rugged Case

Not shown:

- Quick Start Guide
- Ethernet Cable
- Power Cords
- Calibration Dock

MINI Z Specs



Scanner Dimensions

Length: 11.5 in (29.2 cm)
 Width: 9.8 in (24.9 cm)
 Height: 7.6 in (19.3 cm)
 Weight: 9.2 lbs (4.2 kg)
 Operating Time: 4 hrs per battery charge (typical, based on 25% duty cycle)
 Scan Speed: 6 in (15 cm) per second (typical)
 Operating Environment: IP 54 Rated
 Operating Temperature: 0° C to 45° C (32° F to 113° F)

A Bit About X-rays: How X-rays Interact with Matter

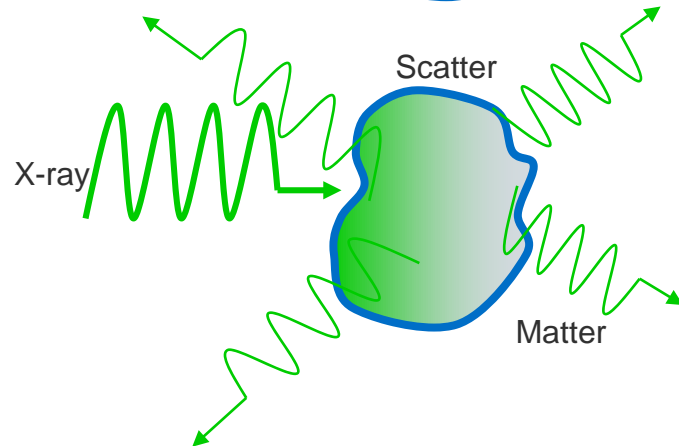
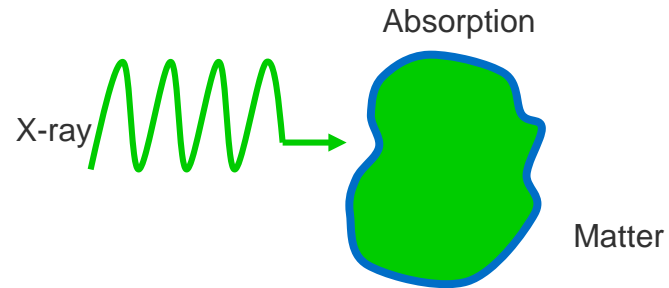
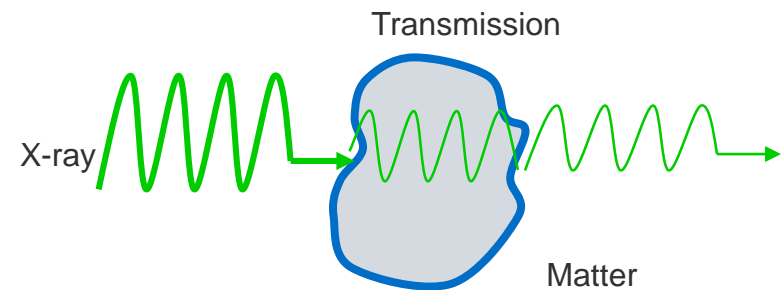
X-ray energy will do 1 of 3 things when interacting with material

- Pass through
- Become absorbed
- Scatter (Compton Scattering)

These basic principles form the basis of X-ray imaging

- Transmission X-ray imaging
 - ▶ Pass through / Absorb
- Z Backscatter X-ray imaging
 - ▶ Compton Scattering

MINI Z generates an image from the scattered X-rays, highlighting drugs, plastic weapons and other organic contraband and threats, as these types of materials scatter more X-rays



MINI Z Prison Applications

MINI Z can be used for scanning:

- Mattresses for objects such as guns, pens, pills, syringes and screwdrivers
- Concrete walls for modifications
- Objects hidden behind gypsum board or white boards
- Containers of liquids for weapons
- Delivery vehicles for smuggled drugs



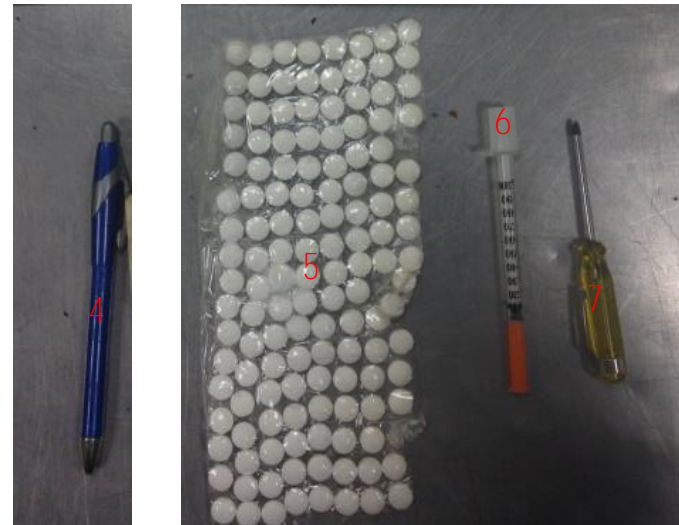
MINI Z Screening Mattresses

MINI Z provides useful images of many threat objects in a variety of scenarios

AS&E has tested scanning a 4" foam mattress with a cotton mattress pad (with no metal content) for the following objects:



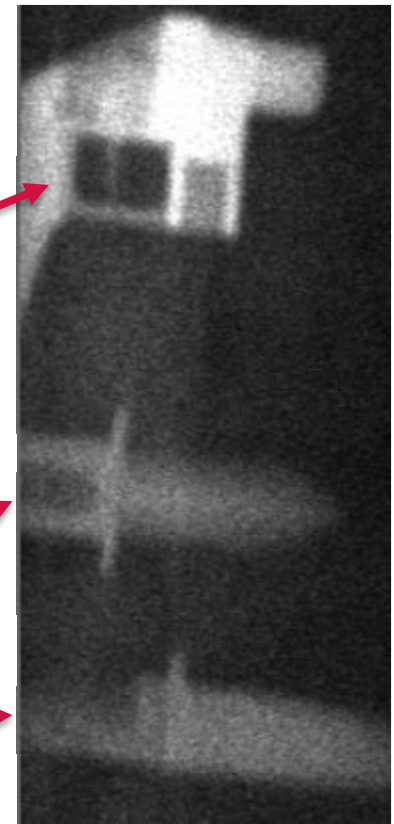
1. All-plastic handgun
2. Composite knife
3. Plastic knife
4. Ballpoint pen
5. Single layer of pills
6. Syringe
7. Small screwdriver



MINI Z Screening Mattresses (cont.)

Here is a MINI Z scan of a mattress on a steel bed showing the plastic handgun, composite knife and plastic knife, which were placed in the center of the mattress between the foam and the cotton batting

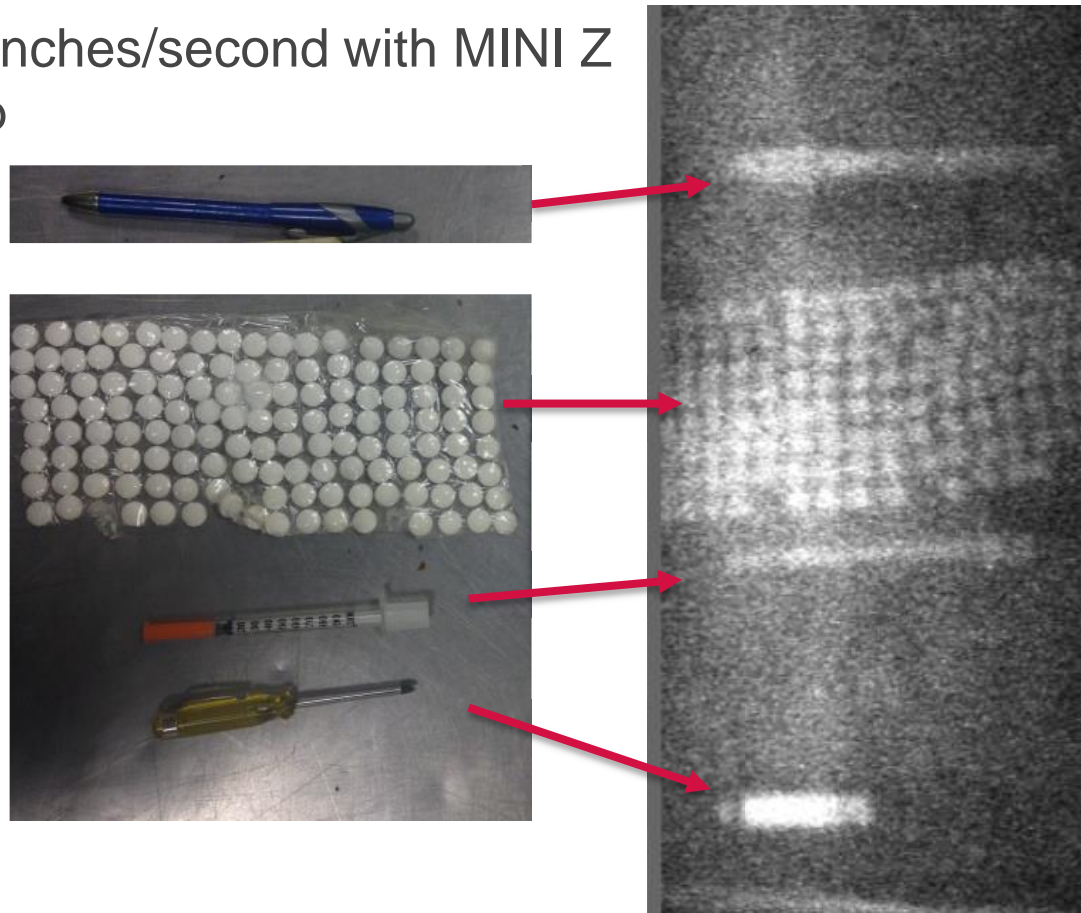
The scan was taken at ~6 inches/second with MINI Z being moved along the top of the mattress so the image covers about 6 inches (width) of the mattress in a single sweep



MINI Z Screening Mattresses (cont.)

Here is a MINI Z scan of a mattress on a steel bed showing the pen, pills, syringe and screwdriver, which were placed in the center of the mattress between the foam and the cotton batting

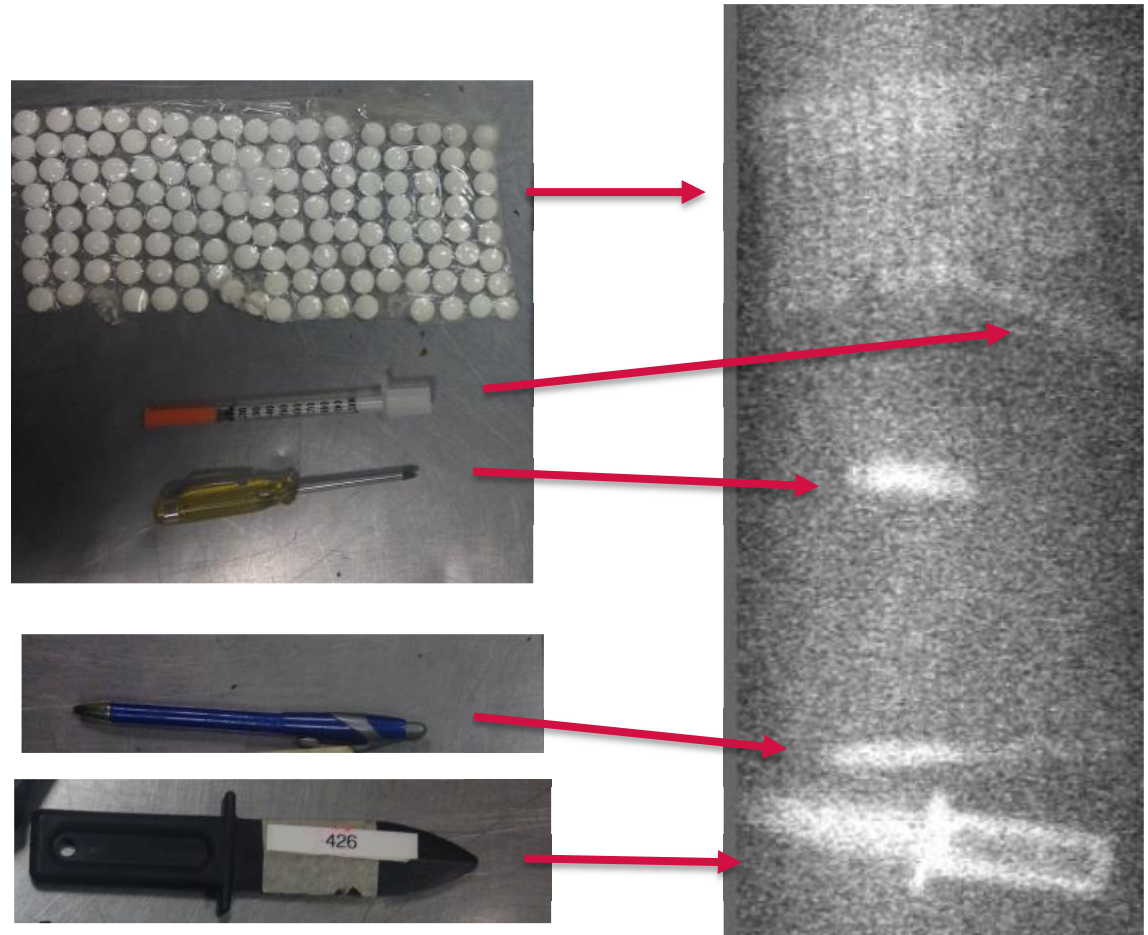
The scan was taken at ~6 inches/second with MINI Z being moved along the top of the mattress



MINI Z Screening Mattresses (cont.)

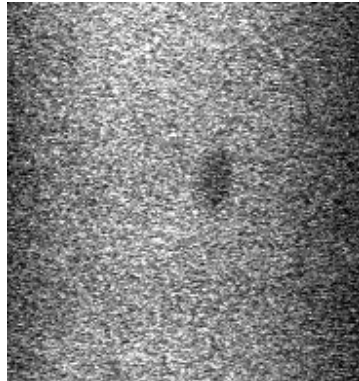
Here is a MINI Z scan of a mattress on a steel bed with the threats placed under the mattress

The scan was taken at ~6 inches/second with MINI Z being moved along the top of the mattress

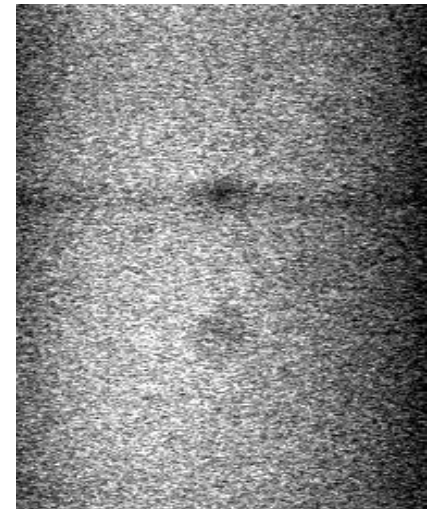


MINI Z Screening Modified Concrete Walls

MINI Z cannot penetrate concrete, however, it can help identify modifications to the concrete when different material is used



Hole patched with silicone RTV



Holes patched with plaster compound

MINI Z Scanning Gypsum Board

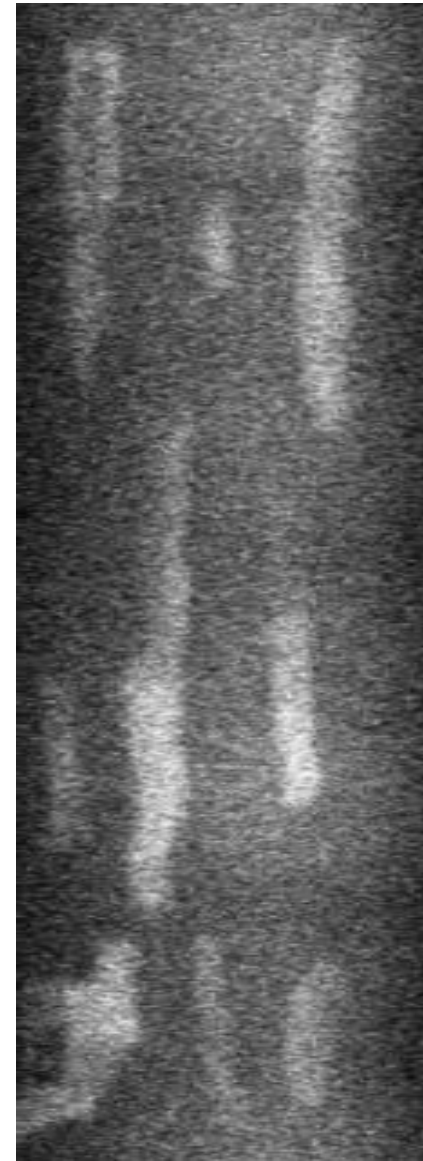
Tested scanning 5/8 gypsum board for the following objects:

1. Composite knife
2. Small screw driver with plastic handle
3. Aluminum knife
4. Ceramic knife
5. Plastic knife
6. Metal blade knife with plastic handle
7. Plastic handgun (liberator)
8. Glass knife
9. Metal folding knife with plastic handle



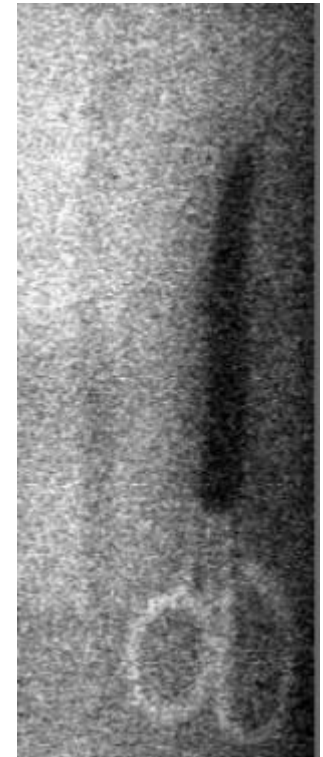
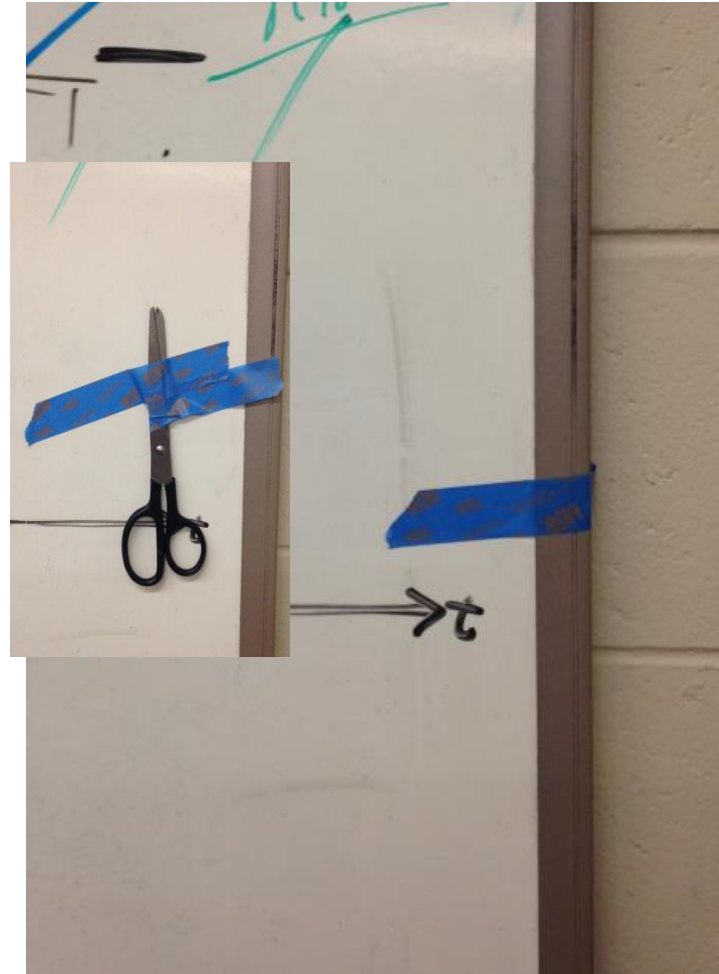
MINI Z Scanning Gypsum Board (cont.)

All threats can be seen when they are behind the gypsum board with a background of air



MINI Z Scanning a White Board

Here is a MINI Z image of a pair of scissors concealed behind a white board that is mounted to a concrete wall

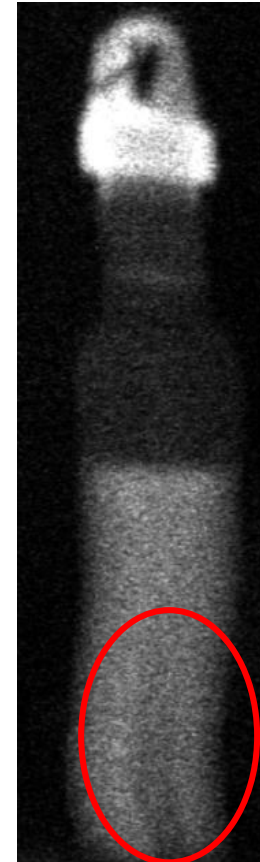


MINI Z Scanning Containers of Liquids

AS&E also tested some threats objects that were concealed in containers of liquids

Here is a MINI Z image of a metal knife concealed in an aluminum container filled with water

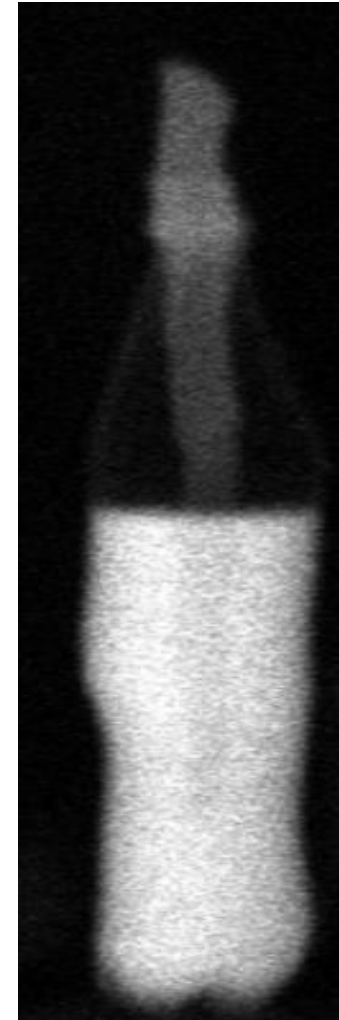
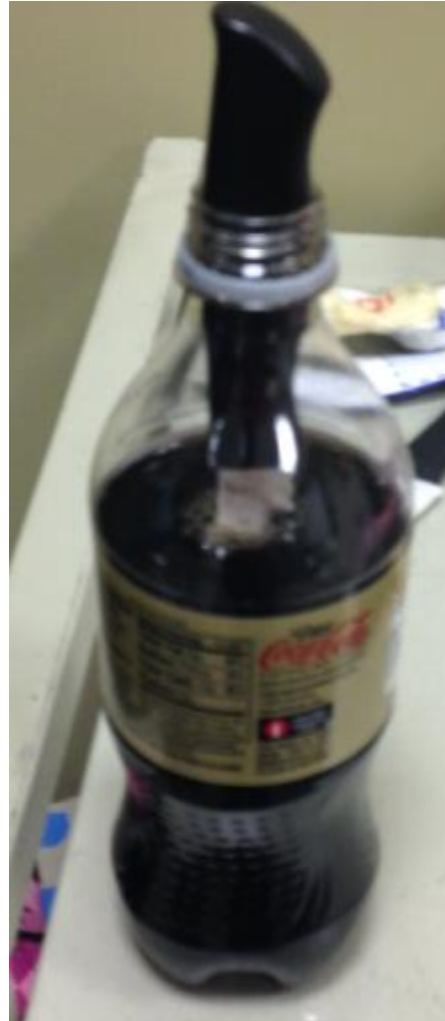
The metal knife absorbs more X-rays than the surrounding water and so it is visible in the image



MINI Z Scanning Containers of Liquids (cont.)

Here is an image of a ceramic knife placed in the center of a soda bottle

Since the orientation of the threat object within the container will vary, AS&E recommends taking multiple scans from different sides of the container



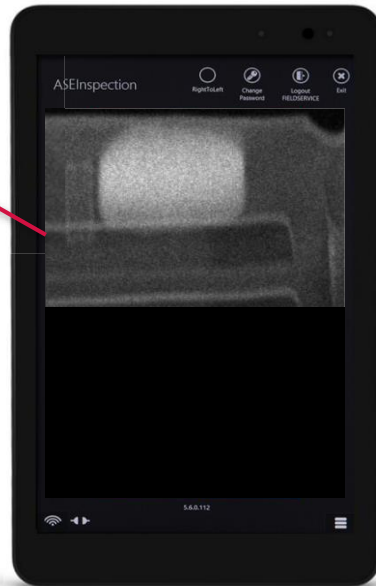
MINI Z Scanning Vehicles

MINI Z can also be used to scan vehicle interiors, tires, bumpers and other non-metallic surfaces for detection of smuggled drugs

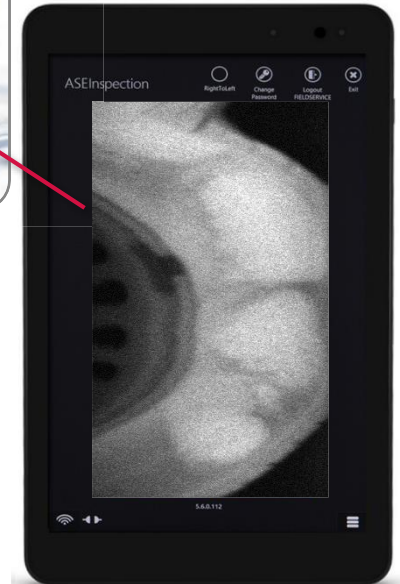


Narcotic simulant in a car seat

MINI Z Scanning Vehicles (cont.)



Narcotic simulant in bumper

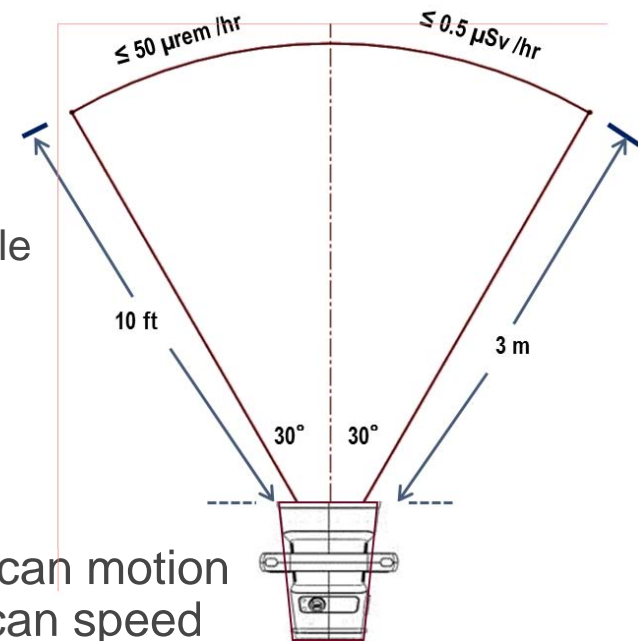


Narcotic simulant in tire

MINI Z Safety

The MINI Z system is safe for operators, bystanders, and the environment.

- The MINI Z **Operator Exposure** levels conform with the appropriate ICRP, NCRP, and EURATOM radiation safety standards.
 - ▶ $<0.5\mu\text{Sv}$ in any 1 hour to operator at 100% duty cycle
 - ▶ The MINI Z system shielding ensures that a full time Operator's Exposure remains well below the NCRP, ICRP, and Euratom annual allowable radiation dose levels for the "general public and minors" of 100 milliRem (1 mSv).
- The MINI Z **Scan Dose**, while limited, varies with scan motion and distance. A typical dose to target, at 6 in/sec scan speed and 4 in. scan distance, is less than 10 microRem (0.10 uSv).
 - ▶ Although the MINI Z is a low-energy and low-dose Z Backscatter system, it is not designed to scan people.
 - ▶ The MINI Z system must be used in accordance with the manufacturer's instructions and under the jurisdiction of local laws and regulations.



Radiation Controlled Zone

MINI Z Safety Design Elements

To help prevent inadvertent emission of X-rays, the MINI Z is equipped with a series of interlocks that must be activated to enable X-ray generation



- 1. Key on the scanner:**
Key must be inserted and turned to 'unlock' the scanner

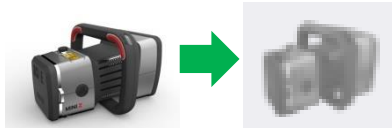


Interconnection Status icon



- 2. Connection to Tablet must be established**

MINI Z Safety Design Elements (cont.)



3. Enabling scanner via tablet

These icons appear only on the scan screen, the shaded icon identifies the scanner as being disabled



4. Handle mounted trigger switches

The scanner will only emit X-rays when one, or both, of the trigger switches are pressed.



5. Timer

The MINI Z will only emit X-rays for a maximum of 30 seconds and will automatically stop, regardless if the triggers are still activated. If the scanner remains idle for 30 seconds, system will disable.

MINI Z: A Powerful Tool to Aid Prison Officers

MINI Z gives officers at correctional facilities a unique, easy-to-use scanning tool to address multiple concealment scenarios

Whether for routine inspections or for suspicious circumstances, the MINI Z is a versatile tool that can help officers detect threats and contraband in a range of objects from mattresses to vehicles

MINI Z uses proven Backscatter technology to provide useful images of drugs, plastic weapons, syringes and other threats and contraband

MINI Z is safe for operators and scanned objects

