EXPLOSIVE FINDINGS

IF YOU NEED A WAY TO DETECT AND IDENTIFY EXPLOSIVE MATERIAL WITH A HANDHELD DEVICE, YOU NOW HAVE SEVERAL TECHNOLOGIES TO CHOOSE FROM.

Everyone has seen the hulking devices used to screen for explosives in airport terminals. But thanks to improved technology (actually, multiple kinds of technology), trace explosives detectors are now smaller and easier to use. These handheld devices are sized to fit in a cargo pocket and can detect the smallest amounts of explosive materials and the precursors used to make bombs. They're rugged enough to use outside in almost any environment and light enough to comfortably carry on duty. Although not cheap, they are also more affordable. All of this makes them more accessible to individual bomb techs and even patrol officers.

With the variety of devices available using different methods to accomplish the same goal, it can be difficult to know what to look for. With that in mind, here's a look at what makes some of the available handheld trace explosives detectors tick.

FLIR

FLIR HAS BEEN IN THE EXPLOSIVES DETECTION GAME FOR A WHILE NOW, and its newest handheld detector is smaller and lighter with more capabilities. Fido X3 is designed for broad threat detection. In addition to traditional explosives materials it detects homemade explosives such as nitrate-based fertilizer-type explosives like ammonium nitrate and urea nitrate and peroxide-based explosives as well as liquid threats. The Fido X3 also has an eight-hour battery, starts in less than five minutes, and reports results within 15 seconds.

Agencies in several major metropolitan areas are using Fido X3, says FLIR's Aimee Rose, a researcher who now directs global sales of Fido products as the product sales director. It's being used in counter-terrorism operations by specialized law enforcement agencies. But officers also use it to screen crowds at special events as well as in transit protection for subways and buses.

The way it works is built around fluorescent polymers designed to be specifically reactive with explosives. "When explosives interact with these materials, it changes the optical properties of the polymers, and that changes what is measured by the device, and the device reports that as a detection event," explains Rose. "The electronics that are required are very simple. You really just need a light source like an LED and a photo detector. And as a result, the device is much less finicky and much more robust than traditional explosive trace detectors."

Fido X3 was designed with adaptability in mind, so in the case of a new threat, you can swap out a consumable in the device for one that can detect that type of explosive because Fido X3's advanced microprocessor is made to adjust for it.

Training teams teach officers how to use the X3 in a four-hour class, but instruction for how to operate the device takes only one hour. The rest of the train-


FLIR

IN HAND

MELANIE BASICH

ing covers the concept of trace explosives, including what to look for and where. But FLIR is incorporating training into the device as well. The X3's color LCD display provides user help, including videos demonstrating how to use the system.

"In cases where you're concerned with explosives due to heightened security or intelligence information or just managing large crowds, you really can deliver aviation checkpoint levels of security without a lot of hassle," says Rose. "FLIR's X3 is easy to use and provides very high throughput screening to give you the ability to search out any type of dangerous or concealed explosives. We're giving you a way to see a threat that you couldn't see before."

MORPHIX TECHNOLOGIES

Morphix Technologies' Tracex Explosives Kit is designed to detect all the major families of explosive materials and their precursors with a single swab, and without exposing the user to dangerous chemicals. It can detect up to nine explosive families in under three minutes using a simple color-change alert system. Each kit can fit in a pocket and comes in its own disposable protective plastic case.

"It's like having an explosive detection K-9 in your pocket," says former FBI agent Patrick "Ed" Buckley. He is in charge of Tracex training as part of Osen Hunter Defense Systems. Most law enforcement officers who use the kit are bomb techs, but Morphix Technologies' goal is to get it out to more patrol officers so they can use it on duty, he says.

"The beauty of this equipment is it allows you to triage a building," says Buckley. "If you have a search warrant and think a guy used a certain type of explosive, do test swabbings with the Tracex kit. Then you can focus your search on where you've found the trace evidence exists."

You can also swab people's hands or vehicle in an active environment to find trace evidence of explosive materials or precursors. Or an informant can swipe a surface when a person suspected of making explosives leaves the room and can bring the swab back to law enforcement for testing. "You put it in the Tracex kit, you can tell if there's a coloric change, and the officer can use this information as part of a search warrant," says Buckley.



MORPHIX TECHNOLOGIES

That "coloric change" happens when a swabbing stick is placed in the kit and reagents released inside it detect a material and turn a bright color, each color signaling that a particular explosive type is present. But you don't need to know which color signals each material. When you open up the case you see there are four x's on top, one for each of the explosive types. The little window will change color in relation to the explosive it detected. For example, TATP will occur on the left of kit where the letters "TATP" are written on top.

Buckley says the training needed is minimal. It involves an explanation and demonstration of the few steps involved, which include pushing a button to crush ampoules and inserting the swabbing stick.

"Morphix Technologies' Tracex Kit is very rugged, it will fit in a cargo pocket, it's very simple to use because of the coloric chemistry used, and you get results in about 10 to 15 seconds," sums up Buckley. "It's ridiculously user friendly."

REDX DEFENSE

The Red X Defense XCAT is a handheld device designed to reliably identify explosives, in addition to narcotics and gunshot residue. It is a scaled down version of the XPAK, an explosive detection system created for the military that uses fluorimetric analysis (ultraviolet light analysis) to yield a visual signal that indicates the presence of the test substance. Unlike other trace explosive detectors, it provides a simple "detection" or "no detection" response via a green or red light.

The XCAT can be used to detect explosives at special events and is often used in airports. But the fact that the same device can detect drugs and gunshot residue also makes it more broadly applicable.

"The XCAT has become a good piece of equipment to help us check things farther away from the terminal because it's so portable, and we'll use it if the K-9s aren't available," says Gerald Clinger, a former bomb tech and currently assistant chief of the Indianapolis Airport Police Department. "We like the ease of use and quick results."

And the device is made to be easy to use. The officer simply selects the test card that matches the suspected substance, swipes the card over suspected surfaces to sample a trace amount of the substance, and places the card back in the XCAT and closes the door. "At that point the XCAT takes over, and in 30 seconds you have a red light or green light. And you take ac-



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RED X DEFENSE

tion based on that," says Clinger.

Red X Defense has a set of training videos on YouTube that Clinger's agency used to show officers how to use the device during roll call. They then had the officers use the XCAT with sample cards so they could get used to it. "Everybody understood the concept. I mean it only works one way; the sampling card only goes in one way," Clinger says. "We call it cop-proof. If a cop couldn't break it and could figure it out, it was going to work for us."

The Indianapolis Airport Police Department has been using the XCAT for six months and the officers and command staff are very happy with it. And should they need it to detect a new threat down the line, they can just insert a different test card.

"Around here we like to get these things resolved quickly because of the trickle-down effect with the airlines," says Clinger. "Should we have to close a gate to check an unattended bag, we can show up with the XCAT, swab it, put the sample card into the unit, and have a result back in under one minute. And that really speeds things up for us."

SMITHS DETECTION

ACE-ID FROM SMITHS DETECTION USES LASER TECHNOLOGY, specifically a certain type of Raman spectroscopy, to perform "non-contact analysis" of solids, liquids, gels, and powders. It can even identify two components in one sample without the device—or the officer—ever touching the substance. Materials can be identified through translucent and semi-translucent containers such as plastic and glass, and a software kit allows for remote operation.

Bomb techs tend to be the officers who use Ace-ID, but a wide range of agencies use it for clandestine drug lab investigations and any "white powder type calls" to determine if a substance is drugs or explosives, says Dr. Chris Weber, applications specialist for Smiths Detection. That's because it can detect approximately 500 substances including explosives, narcotics, and toxic chemicals. An agency can also add samples to the user library via laptop software if a new threat emerges.

It might sound like Ace-ID would need to be complicated, but Weber says it's very

Z BACKSCATTER IN YOUR HAND



American Science & Engineering introduced a new handheld Z Backscatter imaging system just last month. Officers can use the Mini Z to detect explosives, but it's completely different from devices that find trace explosives. Like its much larger brethren used to search cargo, the Mini Z uses AS&E's signature Z Backscatter technology to scan an area and provide a view of hidden explosives, similar to an X-ray machine.

Using AS&E's signature Z Backscatter technology, the Mini Z produces a real-time image of the scan target, highlighting organic materials that transmission X-ray systems can miss, including explosives. Z Backscatter X-ray images highlight low Z effective materials, which are primarily composed of low atomic number elements (Hydrogen, Carbon, Nitrogen, and Oxygen).

Because of the technology used, it is not recommended for scanning people.

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easy to use. "From the officer's perspective, you just turn the instrument on, follow a few short menus, button click, and it uses a laser and it illuminates the sample, and in five to 10 seconds you get the answer for what that material is."

And although a high-powered laser is involved, it's not dangerous. "The Ace-ID is a lot safer because it uses Orbital Raster Scan (ORS) technology," explains Weber. "Lasers, especially stationary lasers, tend to heat the sample, and have heated up explosives and caused injuries. With the ORS used in Ace-ID that's extremely unlikely because the heat from the laser is dispersed over the sample."

Smiths Detection offers online training that takes one to two hours to complete. "We recommend they run a few samples and that is it," Weber says. A screen on the device prompts the user using some text but mostly graphics to illustrate what the officer needs to do.



SMITHS DETECTION

"Ace-ID fits in tactical pants pockets, it's very lightweight, small, and very safe," says Weber. "It's easy to use, increases safety, and speeds up responses so you don't have long periods of time where you have to sit on point and isolate areas and keep people out of buildings. It gets life back to normal a lot faster for the more complex incidents."

FOR MORE INFORMATION

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