

## THE JOURNAL REPORT: TECHNOLOGY

Taking Off

*Technology promises to improve the screening process at airports. Here's what's scheduled to arrive -- and when.*

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Imagine arriving at the airport late for a flight but not particularly worried. After all, you know there won't be a long line at airport security.

In the airport of the future, there may not be security lines at all.

Some of the top minds in transportation security envision a day when sensors embedded in the walls of airport hallways screen people and their carry-ons for threatening material as they walk toward their gates. Messages with images of suspicious travelers would be beamed to security officers, who would detain people who present a threat.

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"You wouldn't see it, but behind the walls, some sort of technology would be checking you for explosives," says Chuck Burke, deputy chief technology officer at the Transportation Security Administration. "Ideally we'd like someone to walk into the entrance of an airport, pick up tickets and head to the gate."

The bad news for those who chronically run late: Such systems are probably 20 years away. Meantime, the TSA and a bevy of private companies are working to improve technology that will screen travelers and luggage faster and more accurately than existing machines.

At San Francisco International Airport, in addition to regular safety procedures, GE Security has set up a test screening station that passengers are invited to pass through if they have time. In this checkpoint equipped with devices being fine-tuned for deployment in the near future, the metal detector has been replaced with an imaging machine that can peer through clothing to catch metallic and nonmetallic threats alike. (No need to take jackets off.)



**SEALING THE GATES:** Tomorrow's security station, as envisioned by GE. The hardware includes sensors that spot hidden weapons, among other things.

Reston, Va., uses a computer to pick up on anomalies recorded by video cameras and alerts the humans monitoring the system. Suspicious patterns, too, can set off alerts, such as if cameras spot a particular car casing the airport on consecutive days. A system developed by Cernium Corp., Reston, Va., sets off alarms when travelers enter a terminal through exit gates.

Some of the tighter security on airplanes since 2001 doesn't involve advanced technology at all. Cockpit doors have been locked and reinforced with steel. The federal government has deployed thousands of air marshals aboard flights. And the TSA has worked to refine its priorities. Late last year, for instance, TSA screeners stopped confiscating small scissors and tools so they could focus more on looking for explosives.

Still, advanced technology is increasingly at the heart of efforts to make flying more secure, and nowhere is the focus more intense right now than on improving the ability to detect plastic explosives in checked luggage, carry-on bags and on travelers themselves.

What follows is a look at innovations in this area -- some currently deployed, others still in development.

## **PEOPLE SCREENING**

Since the 1970s, metal detectors have screened airplane passengers for guns, knives and other weapons. What a metal detector won't do, however, is detect a plastic explosive strapped to the body.

A few devices that will:

The X-ray machine for carry-on bags has been replaced with a more sophisticated, unmanned CT scanner. And sensors placed low in a short walkway automatically scan shoes, saving passengers from having to remove their footwear.

"We think we can blow up the traditional notion of a passenger checkpoint," says Steve Hill, a spokesman for GE Security, a subsidiary of [General Electric](#) Co.

In addition to new screening techniques, there are now advanced video systems that monitor airport perimeters and doors used by employees to enter secure areas. One technology, offered by Vidient Inc., of Sunnyvale, Calif., and ObjectVideo Inc., of

- **PUFFERS:** Officially called "trace portals," these machines are able to detect minute traces of explosive residue on travelers. A person steps into the arched portal, and several strong puffs of air shoot from either side. The puffs shake loose tiny bits of explosive, and the machine analyzes the air for suspicious material.

The TSA began rolling these out to airports last year and now has about 60 in place, planning for 150 by year's end.

"I'm surprised it's taken this long to get it going," says Colleen Osterberg of Castro Valley, Calif., traveling through the Baltimore-Washington International Airport. Her 6-year-old son, Daniel, declares: "I like the puffs."

The puffer is made by GE Security and Smiths Detection, a unit of London-based Smiths Group PLC. A technology being developed by New York-based L-3 Communications Holdings Inc. would check for explosives by analyzing material of traveler's skin and clothing when they push a short swinging gate.

- **FINGER SAMPLERS:** Like puffers, a finger sampler aims to detect explosive residue, in this case from the touch of a finger or a hand onto a pad. It works because tiny explosives stick under the skin and under the fingernails, even after someone washes his or her hands several times.

This technology will soon be tested by the TSA (in combination with a shoe scanner) and could be deployed as early as this summer as part of the federal Registered Traveler program, a membership service that aims to give prescreened passengers a faster alternative to the usual airport security lines.

- **SHOE SCANNERS:** This may be the technology that travelers await most fervently. Shoe scanners use something called quadrupole resonance to measure the material inside shoes as the passengers walk over a small bridge-like apparatus with low walls containing sensors. The machine is programmed to recognize the frequencies of various explosive materials -- all without taking the footwear off.

"Anyone traveling knows how annoying it is to remove your shoes," says Christopher Crowley, a GE Security principal engineer who helped develop the shoe scanner.

GE Security also has a machine at which passengers stand to have finger samples and shoe scans performed simultaneously -- a device that is being tested by the TSA. If this device wins approval, New York-based Verified Identity Pass Inc. plans to use it in the special lines for frequent travelers who sign up for the Registered Traveler program. Registered Traveler, which also will use recorded personal and biometric identifications like fingerprints, is expected to be launched along with the new screening machines as early as June.

- **BACKSCATTER:** Puffer machines and shoe scanners may detect explosives, but they can't spot hidden weapons. A backscatter machine can spot both, using X-rays to take pictures that penetrate clothing but not skin. For its ability to see it all, some call it the "naked machine."

The technology has been available for many months, but privacy concerns have held up its deployment. Rapiscan Systems, a division of [OSI Systems Inc.](#), of Hawthorne, Calif., and [American Science & Engineering Inc.](#), Billerica, Mass, have worked to develop proxy images that mask private parts. The image created would show the outline of foreign objects on the body, but not the body itself. Pilot testing on these machines, which cost \$70,000 to \$100,000, should begin in early spring.

- **MILLIMETER WAVE:** This technology does the same thing as backscatter machines, but without any radiation. A prototype millimeter-wave machine has been delivered to the TSA by its maker, Safeview Inc., of Santa Clara, Calif., recently acquired by L-3, but the TSA hasn't begun testing. The technology faces the same privacy concerns as backscatter.

## **CARRY-ON BAGS**

Technology for screening carry-on bags hasn't changed much since 9/11. Enhanced X-rays display images on a screen, which humans examine for weapons and explosives. Screeners swab bags and then test the swabs for explosives, a time-consuming process.

An innovation being considered: CT scans. CT, or computed tomography, is commonly used in medicine, and is now used for all checked bags, but not for carry-ons. CT scanners use X-ray images to create a 3-D picture, allowing automatic detection of various objects. Also being developed are multiview X-rays that deliver similar images but are less expensive than CT technology.

The key to the technology is this: These machines don't depend on human eyes. Alarms go off automatically, based on the density of material present. That would allow much faster processing of travelers.

The TSA expects to begin pilot tests of advanced scanners for carry-on bags in eight to 10 months, though cost might delay actual deployment of the devices; they're more expensive than regular X-ray scanners.

The current system desperately needs an upgrade, says Clark Kent Ervin, former inspector general for the Department of Homeland Security and now director of the Aspen Institute Homeland Security Initiative, a Washington, D.C., think tank.

"If you're a terrorist, you can put the bag on in such a way the screener can't see it," says Mr. Ervin, who adds that advanced scanners can fix this problem. The TSA recognizes the problem and plans to test CT technology on carry-ons.

## CHECKED BAGGAGE

By law, all checked baggage must be scanned with CT machines for explosives. But these systems are slow, tend to break down a lot and make mistakes. Today, 15% to 20% of all bags must be opened up because a CT machine falsely flagged them as threatening.

The systems work best when used with an in-line system, where bags on a conveyor belt automatically go through a CT scanner. Airports with in-line systems can scan 450 to 500 bags per hour; ones without handle 250. And the van-size systems from [Electronic Data Systems](#) Corp. that typically sit in airport lobbies handle 150 to 180 bags per hour.

Just 18 airports have or are close to having full in-line systems; 36 have a combination of systems, where some but not all terminals have in-line.

Airports are working, with limited federal funding, to upgrade. But in the meantime, technology companies are working to develop new machines that will move more quickly, break down less and be more accurate.

Rapiscan Systems is testing a new CT machine in England. Those now in use have a spinning gantry that rotates as the bags are moving through in order to obtain multiple views of each bag. The Rapiscan system would no longer spin, but would use multiple cameras to get many more views of each bag as it moves along the belt. The company says it can capture 432 views (compared with 16 to 20 by existing machines) and scan more than 1,500 bags per hour.

No matter what innovations come along, though, Mr. Burke of the TSA warns that no system will ever be perfect. "There is no 100%. There is no silver bullet," he says. "The bad guys are as smart as we are."

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