

Passenger Screening: closing the loopholes

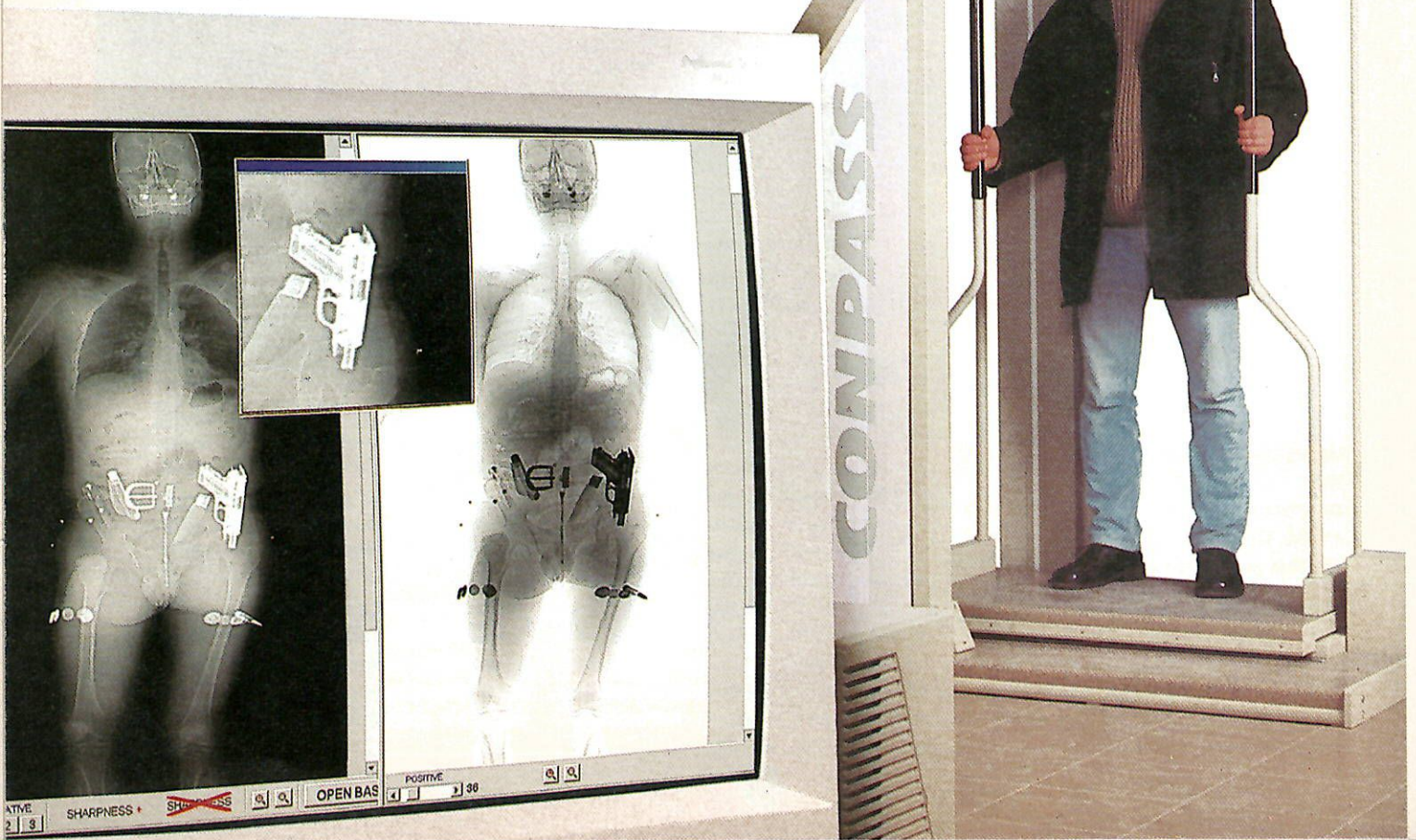
Significant technological advances have been made in respect of baggage inspection, but the same has not been quite as apparent in relation to the screening of passengers themselves.

Philip Baum looks at some of the systems now available set to become intrinsic elements of airport checkpoints...

As a response to the significant number of hijacks that were occurring around the world in the 1960's and early 1970's, the aviation industry introduced two systems designed to identify weapons being taken onto aircraft – the cabin baggage X-ray machine and the archway metal detector. The former identified dense items packed into relatively small items of hand baggage, whilst the latter, supported by the use of hand-held magnetometers, identified the presence of metallic items concealed on the passenger's person. Whilst the detection capabilities have increased over the years, there has been little movement in respect of the identification of non-

metallic threat items.

This is somewhat surprising given the emphasis placed on the detection capabilities of checked baggage screening systems today. In the post-Lockerbie era, where the threat of an explosive charge being infiltrated onto a passenger aircraft is our primary concern, and has resulted in the development of advanced X-ray and CT scanning technologies, we have been more reserved with regard to implementing similar detection requirements for passenger screening.



Initially, it was argued that bombs designed to sabotage aircraft in flight were only really likely to be infiltrated on board via checked luggage, yet this is not necessarily the case. Take the destruction of Korean Airlines flight 858 as an example, where the bombers carried the device onto the aircraft concealed in a radio and whiskey bottle; they set the bomb to explode during the leg of the flight subsequent to their disembarking at a transit stop.

The identification of explosives concealed on a passenger, profiling aside, is still a loophole in most airport's security systems. Yet things are beginning to change and the days of passenger X-ray and passenger vapour detection portals are almost upon us. Indeed, the technology does exist.

PASSENGER X-RAY

Customs authorities already utilise passenger X-ray systems, as it is regarded as a less intrusive form of screening than the strip search. Yet such screening is only carried out when they believe a reasonable chance exists that a passenger is smuggling illegal substances or excesses of dutiable products. Systematic screening, as would be required by a security checkpoint, poses other problems. Albeit that the cost of upgrading the world's checkpoints will be considerable, cost alone is not the only barrier to the speedy proliferation of the latest systems.

The biggest problem lies in their acceptance by the travelling public. Many feel uncomfortable with degree of invasion of privacy that such systems offer, and the very concept of undergoing an X-ray every time one travels creates fears amongst passengers as to potential health risk.

One recent report branded the X-ray screening of passengers as "X-Rated X-Ray", as the images produced give the examiner a pretty clear view of the passenger's body form. And whilst it is recommended that male screeners only screen male passengers, and female screeners screen female passengers, many are uncomfortable with the idea that any person, regardless as to sex, be able to view them with "X-ray specs".

Yet this has not deterred some of the major X-ray manufacturers from investing in the R&D of passenger X-ray. Rapiscan, American Science & Engineering and MMC International are

all actively marketing systems.

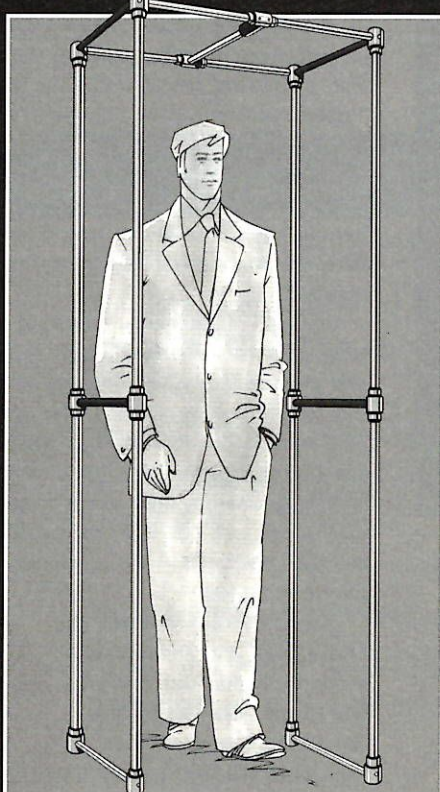
MMC International have developed the COMPASS Body Scanner. The operating principle is based on the use of a very narrow collimated X-ray beam. The radiation exposure is read by a highly sensitive linear multi-element semiconductor detector which converts the information into a high resolution X-ray image on the operator's screen within ten seconds of the scan. This is done without the use of X-ray film.

There are two systems available. The COMPASS mod CABIN provides for the synchronised movement of the X-ray source together with the detector relative to a stationary person, whereas the

COMPASS mod GATE relies on the passenger standing on a moving platform (similar to the conveyor belt concept of a traditional baggage X-ray machine) which passes in front of the X-ray beam.

American Science & Engineering manufacture the BodySearch™, already installed by United States Customs in six airports around America. The system utilises AS&E patented Z® Backscatter technology, first developed in 1986. This has been particularly useful in respect of X-raying the human body where the intent is to detect items that would not normally be detected by the traditional archway metal detector. Low density materials, such as narcotics and explo-

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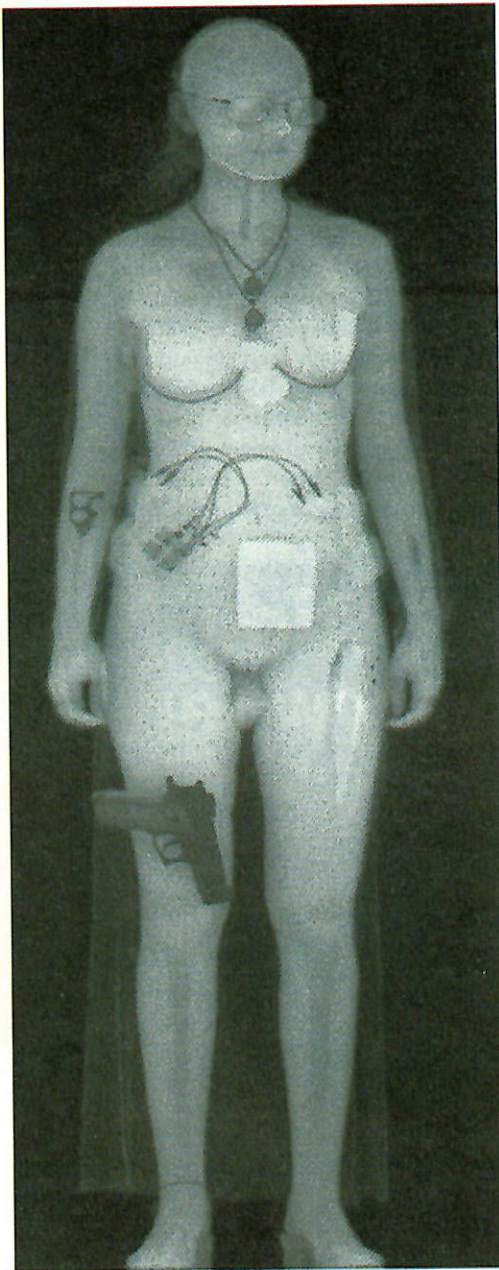


IMAGE OF A WOMAN FROM AS&E'S BODYSEARCH™. VISIBLE METAL ITEMS INCLUDE A SMALL SURVIVAL KNIFE ON HER RIGHT FOREARM, WIRE OF A BOMB, A RAZOR BLADE ON HER LEFT FOREARMS, A METAL GUN, AND UNDERWIRE OF HER BRASSIERE. VISIBLE PLASTICS INCLUDE DRUGS IN THE GROIN, CHEST AND STOMACH AREAS, A PLASTIC KNIFE ON HER LEFT THIGH AND EXPLOSIVES ON THE WAIST.

sives, are identifiable as the Z@ Backscatter technology is designed to highlight such low atomic number materials in a separate image.

Despite the understandable safety concerns, the X-raying of passengers does not pose any health risk. The issue is one of perception though. Most passengers are blissfully ignorant as to the quantity of radiation exposure they encounter by boarding an aircraft for a one hour flight; standing in front of an X-ray machine, however, seems more ominous. The risk appears greater, let alone the feeling of being considered a suspect. Reality is somewhat different: as the body screening systems are primarily designed to identify contraband secreted on a passenger's body, the X-rays utilised are low power and differ considerably from the X-rays used for medical examination.

VAPOUR DETECTION PORTALS

Vapour detection technology may prefer the more socially acceptable solution to passenger screening, albeit that it does not afford the operator the same pinpoint accuracy as to the source of a problem. Furthermore, unlike the AMD, scanning is not instantaneous.

Barringer, Ion Track and Thermedics have all been actively developing portal detectors that resemble archway metal detectors.

Ion Track Instruments is nearing the completion of a walk-through vapour and particle explosives detector called the EntryScan. It utilises the same patented Ion Trap Mobility Spectrometry technology found in their ITEMISER, whereby microscopic traces of explosives such as C4, RDX, PETN, Semtex, HMX, TNT and dynamite can be identified.

The EntryScan works on the principle of the human convection plume. The human body emits heat to achieve temperature regulation and this heat transfer process warms the air in contact with the body, which in turn creates a convection flow around the body in an upward direction. Vapours and particles given off by the body are carried upwards by the plume and can be sampled above the person's head. Sample collection is completely non-intrusive.

Barringer, meanwhile, have just launched their Sentinel. The Sentinel can screen about seven people per minute and can detect minute particles or vapours of a full array of substances. For the airline passenger already accustomed to passing through a metal detector, the Sentinel is not appreciatively different. The individual stands in the portal while an air-flow gently dislodges particles. Particle samples, as well as vapours, are collected and analysed within seconds. The portal also includes a metal detector, thereby integrating the two technologies and preventing the need for double-scanning.

Whilst passenger X-ray and screening by portal explosive detectors may fast becoming a reality, the traditional forms of passenger inspection systems are also being improved upon.

ARCHWAY METAL DETECTORS

Archway metal detectors are now capable of advising the security guard as to where the cause of the alarm is on a passenger's body by means of zone technology. CEIA, Metorex and Ranger all offer such multi-zone detection capability.

CEIA's PMD2, the Programmable Metal Detector, offers a 'height on person' display, indicating to the screener the position of the suspect item on the passenger by means of illuminated LEDs on the side of the system. The system utilises a magnetic scanning technique that ensures higher discrimination of

The human convection plume (Photo Credit: Ion Track Instruments)





Barringer's Sentinel incorporates both explosive and metal detection technologies

personal metal objects, such as keys and coins, resulting in an increased flow of passengers through the checkpoint.

According to Metorex, multi-zone technology not only speeds up passenger throughput, but also enables the

operator to reduce the sensitivity of the lower zones in areas where the support floor contains structural metal that might otherwise interfere with detection capability. The biggest benefit is, however, that the systems no longer 'add up' the total amount of metal being carried through the checkpoint, yet rather they concentrate on specific areas of metal mass.

HAND HELD MAGNETOMETERS

In respect of hand wand (hand-held magnetometer) detection, Ebinger's EB 610T can detect metal objects even when working in adverse conditions such as close to metal reinforced concrete floors. The wand can discriminate the audio alarms caused by an interfering background from those of guns or larger knives due to a signal change from normal to tremolo sound.

The EB 610T operates on the continuous wave principle, generating a very weak alternating electromagnetic field which is influenced by the presence of metal targets. Changes to the field are

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CONCLUSION

Albeit that there is an urgent need to deploy systems that can effectively detect narcotics and explosives, most criminal acts against aviation are perpetrated by those carrying weapons ranging from daggers to guns and hand grenades to flick-knives. In the USA alone, it is estimated that some 2000 guns per annum are detected by the use of hand-held magnetometers and metal archway detectors. Just look at the number of hijacks (in the Air Watch section of this issue of ASI) that have been perpetrated in the last two months alone to remind yourselves that "traditional" hijacks are still common place. Accordingly metal detection capability will long remain a fundamental feature of any passenger screening checkpoint.

Passenger profiling too is essential, given the dramatic increase in the number of air rage incidents and the number of criminal acts, including hijacking, carried out by passengers who carry neither weapons, explosives or any other threat object. Identification of passengers under the influence of excess alcohol or drugs, or those seeming to be generally unstable requires screeners to be alert to body language and behavioural characteristics as well as being able to operate technology designed to identify specific substances.

However, the loophole that exists in the passenger screening process needs to be addressed, and we have to integrate explosives and narcotics detection technologies at our security checkpoints.

Explosive detection capability is now becoming increasingly more prevalent, not only in respect of checked baggage screening, but also in cabin baggage examination. The same rules must, therefore, be extended to the individual that carries that cabin baggage.

In the same way that access control systems (biometric and card) can now be integrated with metal detection to facilitate the movement of staff into restricted areas, so too the aim must now be for the manufacturers of metal detection and explosive detection and/or passenger X-ray technologies to continue to work together to develop fully-integrated screening portals that combine the different detection methodologies.

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