Made in the USA: in the land of the Qylatron

*Over the course of two weeks, **Philip Baum** travelled the eastern and western coasts of the United States visiting some of the nation's suppliers and manufacturers of services and technologies that safeguard airports and airlines around the globe. He saw some of the names synonymous with screening solutions, such as Morpho and Smiths Detection, along with some of the exciting screening solutions emerging from smaller stables. Qylur's Qylatron and Analogic's Cobra could radicalise checkpoint screening operations, Tek84's Ait84 sets a new benchmark in whole body imaging and Passport Systems may be on the verge of producing a commercially viable and effective solution for cargo inspection. Join us on a journey from Washington to Boston and San Francisco to San Diego.*

The trip's aim was to see innovative solutions that might shape the aviation security system of the future. In a country the size of the US, identifying who to visit in an 11-day period was the first challenge. I knew I couldn't get to everybody and hence limited myself to those companies situated between Washington and Boston on the east coast and between San Francisco and San Diego on the west and, thereafter, it was a question of who wanted visits from an inquisitive Aviation Security International representative! First stop, the nation's capital - Washington DC.

The SPECTRUM Group:

The Spectrum Group is a consulting firm intentionally located close to the decision-makers of Capitol Hill. It provides its clients with security consultancy services through its network of 145 associates, many of whom have served at the highest levels of government and, as such, have a clear appreciation of how new solutions, technologies and concepts might be viewed by the powers-that-be.

Spectrum assists companies in the design and execution of programmes and is able to assist in areas as diverse as regulatory compliance, post-incident investigation and the provision of security audits and threat assessments. It is not limited to the security arena; Spectrum conducts safety audits and is involved in a broad range of educational development programmes (including language skills) within the wider aviation industry.

Smiths Detection:

Conveniently located in Maryland, between the regulators in Washington DC and the TSA's security laboratory in Atlantic City, is the new home of Smiths Detection, one of the five operating divisions of Smiths Group plc, headquartered in the UK. Whilst the Group's pursuits go well beyond aviation security, readers will rightly regard the Smiths name with a degree of reverence granted its global deployments.

Since 1997 Smiths has acquired a range of detection technology companies: Graseby Dynamics (chemical and biological detection); Barringer Instruments (explosives and narcotics trace detection); Heimann Systems (X-ray); and Farran Technology (millimetre wave imaging) to name but a few.

Granted the huge breadth of security solutions under development by Smiths, my visit focussed on four of the company's latest products.

For the inline screening of checked luggage, the HI-SCAN 10080 XCT was launched in May and deployments are anticipated later this year. Developed in cooperation with Analogic (see below), the XCT blends multi-energy X-ray and computed tomography (CT) into a single product which can screen 1,800 bags per hour, using its 100 x 80 tunnel which enables larger items to be screened inline.

For carry-on baggage screening, Smiths Detection has already supplied more than 2,000 aTiX systems to the aviation industry. The HI-SCAN 6040aTiX is the first system to allow automatic explosives detection at security checkpoints. It uses several, independent multi-energy generators, each of which is connected to its own sophisticated and state-of-the-art X-ray sensor technology. Whilst the X-ray functionality is obviously of paramount importance, the aTiX range has also been built ergonomically and the design has taken into consideration both the operator's comfort and airport space limitations.

"...the eqo is a step in the right direction towards enabling screening on the move..."

The eqo (pronounced 'echo') is Smiths Detection's whole body imaging solution utilising millimetre wave technology. Its selling points are the fact that, unlike many of its competitors, the person being screened does not have to enter a cubicle and/or maintain a pose; s/he simply walks through an archway and slowly turns around in one continuous movement. The system has no moving parts. To a certain extent, one doesn't even feel one is

Smiths Detection eqo

being screened and, as such, the eqo is a step in the right direction towards enabling screening on the move. As with their competitors and in order to cater for the US aviation security market, the eqo does not show body images, but rather displays an avatar with potential threats superimposed over the avatar image, directing the screener to the part of the body that requires further examination.

Smiths Detection recognises that millimetre wave has its limitations and that there may well be circumstances when seeing beneath clothing is insufficient. Therefore Smiths Detection offers the B-Scan (short for body scan) utilising low dose (<0.1 μSv per scan) transmission X-ray. The quality of the images achieved in a seven second scan far exceeds those generated by millimetre wave but, as Mark Laustra, Smiths Detection's Vice President Homeland Security, points out, "if we want a risk-based screening system, we need a range of solutions to cater for the various risks identified".

DVTEL:

Whilst most of the major X-ray manufacturers are based in the US, the same cannot be said for providers of CCTV solutions; Scandinavia and Asia are their natural breeding grounds. An exception, however, is DVTEL whose headquarters are in New Jersey.

DVTEL can either provide the entire end-to-end security solution or, if their customers prefer, parts of it. The company develops the video management software platform in-house and can also supply edge devices (hardware) such as the cameras, encoders and video recorders. Ultimately it is what you do with the information the edge device collects that determines how effective the CCTV solution is and that hinges on the video management system, which is DVTEL's forte. As management put it, "we are not selling a box, we are selling a solution."

The company is quick to point out that around 95% of footage recorded by CCTV systems is never viewed. That which is seen is usually in the aftermath of an event and as such CCTV is generally regarded as an evidentiary tool rather than a solution that may detect an unlawful incident and relay information to people who can respond in a timely fashion.

By nature CCTV systems harvest vast quantities of data, all of which occupies space. The DVTEL team has developed compression algorithms which can now reduce by 50% the storage requirements for video. They have also developed a mobile phone application, TruWitness™, which turns an Android smart phone into a live streaming CCTV camera. This new application, available through DVTEL's video management software, can collect in real-time events and send them to an airport's command and control centre. In effect, every Android mobile phone in the hands of airport employees provides an additional camera, intelligently deployed, and providing coverage airport wide. First responders become primary reporters. So, for example, if an airport employee witnesses an incident taking place, they can simply film what they are seeing and feed it into the airport's CCTV system real-time over the Wifi network. This, potentially, has in-flight security applications as well.

"...TruWitness turns an Android smart phone into a live streaming CCTV camera..."

DVTEL has managed to become a global player with offices worldwide and close to 10,000 installations throughout the world, including airports in the UK, Bangkok, Delhi, Mumbai, Goa and, just around the corner from their offices, Newark. Other installations include Haifa Port in Israel and highways in Australia.

DVTEL's TruWitness

Global Elite:
In Garden City, close to New York's John F Kennedy International Airport are the headquarters of Global Elite. Founded in 2002, Global provides a wide range of aviation services to its airline clientele. Unlike many of their competitors who provide aviation security services as an add-on to their core business, Global considers itself to be a "boutique aviation security company". Management takes the view that just because you can do security does not mean you can do aviation security, yet if you can do aviation security then you can certainly provide expertise in other niche areas. With that in mind, Global has entered the events management, executive protection and emergency response management markets.

Landmark Aviation was the company's first client and they now service 36 airlines in nine airports around the US. Obtaining new contracts is not only a matter of winning the bidding war as each state has its own laws and regulations along with Federal and Airport Rules; so, the company has had to satisfy each individual state's licensing requirements. Additionally, Global has security operations and satellite offices in Qatar, Saudi Arabia, South Africa, Brazil and Argentina.

Global provides the services that go above and beyond the remit of the TSA. Passenger profiling, passenger verification and screening for special charter flights are the company's bread and butter. Global provides full screening services to many sports teams when they fly, both domestically and internationally - screening passengers, guarding and searching aircraft, along with providing the catering, cargo and many other security needs and requirements set forth by their client's respective corporate security departments.

Whilst predominantly a service provider, Global has recently ventured into the realms of product supply and now offers two document scanning solutions – VeriFLY™ and Global Choice – and an aircraft access control tool – SecureSwipe.

> "...if a cleaning company says it is going to supply six cleaners for thirty minutes, SecureSwipe will be able to confirm for the airline if that is what actually happened..."

VeriFLY™ assists in determining whether a passenger can be accepted for a flight by evaluating the authenticity and acceptability of the travel document presented and, subject to client requirements, profiling data to identify passengers that might be a cause for concern. Global Choice takes this a stage further by incorporating facial recognition technology and capturing biometrics of passengers at the check-in and comparing them with the faces of those people actually presenting themselves at the gate for boarding whilst also being part of the airline's general departure control system.

SecureSwipe records all those who enter and leave an aircraft whilst it is being serviced, noting how long each employee has been on board. It offers airlines the ability to ensure that they are getting what they are paying for from their suppliers – if a cleaning company says it is going to supply six cleaners for thirty minutes, SecureSwipe will be able to confirm for the airline if that is what actually happened.

American Innovations:
One of the solution providers we visited was American Innovations, Inc., a manufacturer, distributor and service provider with a specialisation

in vulnerability assessments, the development of training programmes, and the supply of a range of explosives detection, bomb containment and blast mitigation products. Included in the American Innovations range are blast resistant litter bins, bomb containment chambers and the XD-2i portable explosives trace detector which, the company reports, has been deployed in Afghanistan, Iraq, Japan, Thailand and Ethiopia, as well as by a range of US governmental agencies.

This year, the company manufactured more than 10,000 Ai-HME Bulk Homemade Explosive Precursor detection kits for US and Allied Forces serving in Afghanistan. The company is now developing an expanded kit to close widely known detection gaps and this will have airport security applications. The new kits are intended to be deployed in 2013.

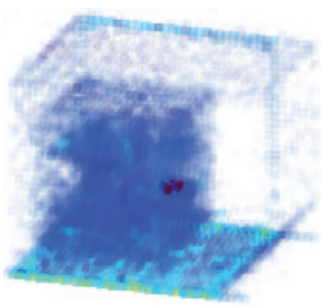
Unusually for the security industry, the company is branded as being a minority, woman-owned, small disadvantaged business. The company was established in 1995 and is headquartered in Chestnut Ridge, New York from where it serves government, military and corporate customers worldwide.

Passport Systems:

Massachusetts is home to many companies specialising in X-ray screening and explosive detection. Small wonder given that the Massachusetts Institute of Technology (MIT) generates more than its fair share of scientists and engineers up to the challenge of converting scientific theory into commercial applications.

Some of those bright minds have been scooped up by Passport Systems, a company formed in 2002, which is working on the development of an air cargo scanner. By August 2008, they had achieved proof of concept and this year the Passport Trident Protection System™ completed operational trials.

The Passport Trident does not require images to be evaluated by screeners as the system provides an automated analysis of the composition of the entire container. It can even distinguish between Coke and Diet Coke...behind several inches of steel!



A 75ft truck, laden with shipments intended for air transportation, can initially be scanned in less than two minutes. During this time a simple automated anomaly detection process is performed, effectively dividing the container into chunks the size of a baseball. If an anomaly is detected a further analysis is performed, targeting the suspect area of the container, in a process that identifies the anomaly within a few minutes.

The material identification solution is based on Nuclear Resonance Fluorescence. In simple terms, a photon beam is generated by an electron accelerator and directed at the consignment. The beam penetrates the cargo, exciting the nuclear state of everything within. Photons are then emitted which are detected by the system and the information about the isotopic composition of the material in the targeted baseball-sized volume is analysed and compared against a library of 'signatures' for substances being sought.

"...it can even distinguish between Coke and Diet Coke..."

Passport Systems' own patented EZ-3D™ three-dimensional radiography technology actually shows the 3D position of any alarm, enabling subsequent targeted threat resolution.

The Passport Trident Protection System™ was originally developed for the identification of nuclear materials carried in sea freight, but the 2010 cargo plot against aviation has emphasised the need for an effective air cargo screening solution.

Thermo Scientific:

Thermo Scientific is a brand already closely associated with aviation security solutions and, in particular, the provision of portable analytical instruments utilising Raman spectroscopy for the identification of potentially hazardous substances.

Raman spectroscopy utilises light, in the form of an intense single wavelength laser beam, and measures how much energy is emitted by the material being evaluated. The laser excites the bonds of the molecules of the substance and scatters measurable light (energy), with each substance generating its own unique chemical signature.

In the US, the TSA is already using the Thermo Scientific FirstDefender RM as an alarm resolution tool. At every major US airport, when screeners detect a potential threat, they are able to call for an officer to attend and carry out advanced screening – and, more importantly, identification – with a FirstDefender RM, comparing the substance being analysed against a database of some 11,000 different compounds.

Screening takes seconds and the system shows its results on colour-coded screens which require no user interpretation.

One of the company's latest offerings is the TruScreen, specifically designed for the identification of liquid threat screening and identification. Results are simply displayed as being 'Clear' or 'Alarm' and, in the case of an alarm, the threat is specifically identified thereby enabling the security services to respond in an appropriate manner. As the company puts it, "hydrogen peroxide and nitroglycerine both trigger an alarm, but the difference in response is critical".

The TruScreen bottle scanner has already had sales in South Korea, Germany, India and Norway.

Analogic Corporation:

Analogic Corporation was founded in 1967 and has a background in medical imaging technology; it is estimated that their technology is in around 50% of all computed tomography (CT) and magnetic resonance imaging (MRI) scanners in the world.

Over the past 15 years Analogic has developed a range of solutions for the security industry, where the goal, as with the healthcare range, is to save lives. Today, Analogic employs some 1500 staff, 400 of whom have PhDs in advanced engineering subjects.

Analogic has developed and deployed more than 1,100 state-of-the-art threat-detection systems and subsystems for use in airports around the world; their CT technology meets the highest TSA and ECAC standards for threat detection.

The company provides innovative checked and checkpoint baggage solutions for a wide spectrum of customers ranging from small regional airports to large international hubs, their first explosive detection system (EDS) being installed in Rome, Italy in 1998.

Analogic has two key channel partners in the checked baggage space: L-3 Communications and Smiths Detection. Both of these companies could, in some respects, be regarded as Analogic's competitors, and they certainly compete with each other, but, with clearly defined target markets, it

Analogic's COBRA

is a business model that works well in the medical inspection space and there is no reason, nor sign, that it shouldn't work within the security industry.

The Cobra (carry-on baggage real-time assessment) system is being sold to market direct by Analogic. This is the product that delivers CT-based technology to the carry-on baggage market. Operating at speeds of up to 30% higher than current checkpoint systems and processing in excess of 550 bags per hour, where laptops and liquids remain inside, on a continuous flow conveyor belt, the Cobra could revolutionise passenger screening.

This July, the COBRA successfully met the European Civil Aviation Conference (ECAC) standard for screening liquids, aerosols, and gels (LAGS) in two different operational modes. The COBRA successfully met that standard in Type D operations, where LAGS remain inside passenger carry-on bags, as well as in Type D+ operations, where both LAGS and complex electronics, such as laptop computers, remain in carry-on baggage.

The Cobra DualUse CT is designed for small- and medium-sized airports that wish to leverage a single system to screen both carry-on and checked luggage. A software switch enables operators to toggle between the carry-on and checked baggage modes in seconds. This unique operational benefit reduces labour, maintenance, installation and equipment commissioning costs. The DualUse system is TSA-certified for checked baggage.

Implant Sciences:

Like many of their counterparts, Implant Sciences' history is based in the medical arena. Today, however, the company is operating exclusively in the explosives and narcotics trace detection space and it places a huge focus on international sales. The Chinese market has been very profitable for the company since the Beijing Olympics, and Implant Sciences products are widely deployed at nuclear power plants in Japan. The company has recently experienced strong sales growth in Africa.

Implant Sciences' Quantum SnifferTM products use Ion Mobility Spectrometry (IMS) to detect and identify threat substances. IMS, the detection technology most commonly used in explosive trace detectors, is an analytical technique that separates and identifies molecules in the gas phase based on flight time down a "drift cell".

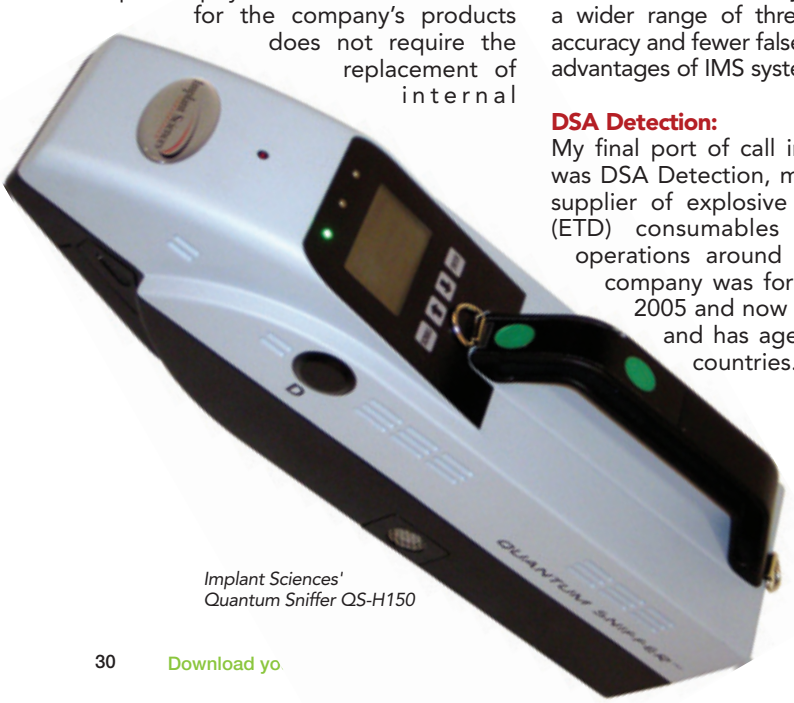
The QS-H150 Handheld Explosives Trace Detector and QS-B220 Desktop Explosives and Drugs Trace Detector incorporate several innovative features, and the company has 15 patents in situ with four additional pending. These patents cover everything from sample collection and analysis to ionization and calibration technologies and provide key advantages in cost of ownership, ease of use, and flexibility to adapt to different roles.

The most noticeable innovation is the patented heated vortex collector of the QS-H150. The vortex is, in effect, a miniature tornado, transporting vapour directly into the explosive trace detector. It allows for the simultaneous detection of explosives particulates and vapours with or without physical contact, and without the use of costly sample traps. The QS-H150 can detect parts-per-billion levels of explosives vapour and nanogram quantities of explosives particulates for most threat substances. To obtain increased sensitivity, the QS-B220 uses a more traditional swab and thermal desorber collection system.

"...the vortex is, in effect, a miniature tornado... transporting vapour directly into the explosive trace detector..."

While the heated vortex may be the most noticeable attribute, other advances provide significant advantages for Implant Sciences' customers. These include a patented non-radioactive ion source that completely eliminates any of the licensing, administration, testing, and disposal costs that can be associated with equipment containing radioactive materials. Further, the company's patented internal automatic self-calibration system increases system uptime, reduces the maintenance burden placed on screening personnel, and lowers the cost of operation.

Indeed, ease-of-use, lower cost of ownership, and increased "uptime" are hallmarks of the Implant Sciences' design philosophy. Routine maintenance for the company's products does not require the replacement of internal components, and cleaning is done using commonly available low-cost materials. Customers report that both the QS-H150 and the QS-B220 are extremely user-friendly with minimal training and maintenance requirements.



Implant Sciences' Quantum Sniffer QS-H150

Currently, the company estimates it has sold around 1,500 systems in more than 35 countries. The domestic market is their next target, and the company's QS-B220 has been designed specifically with TSA certification in mind. Last autumn, the company announced the signing of a Cooperative Research and Development Agreement with Transportation Security Laboratories, making the company the first participant in the new Technology Optimisation Partnership Programme. This programme was created to help manufacturers prepare products to achieve TSA certification/qualification. Less than a year later, in August 2012, Implant Sciences announced that its QS-B220 had completed certification readiness testing and was being submitted for final certification in TSA's Air Cargo Screening Qualification Test.

Looking further to the future, Implant Sciences recently received a patent covering methods of hyphenated trace detection combined ion mobility spectrometry, differential mobility spectrometry, and mass spectrometry. The company believes that this approach will allow it to build systems detecting a wider range of threats with greater accuracy and fewer false alarms with the advantages of IMS system throughput.

DSA Detection:

My final port of call in Massachusetts was DSA Detection, manufacturer and supplier of explosive trace detection (ETD) consumables to checkpoint operations around the world. The company was formed in October 2005 and now employs 24 staff and has agents in ten other countries.

"...consumables are the swabs and traps that screeners use in conjunction with explosive trace detection technologies... the trays used for carry-on baggage inspection, search gloves, calibration and verification pens, and the bowls used by passengers for the divestment of coins..."

Their solutions have been approved by the Department of Homeland Security in the U S, Department for Transport in the UK, Australian Customs, CATSA in Canada and in Israel. DSA is the sole supplier to many high threat, high security government agencies around the world, entrusted with protecting the public and infrastructure.

"...consumables are the swabs and traps that screeners use in conjunction with explosive trace detection technologies... the trays used for carry-on baggage inspection, search gloves, calibration and verification pens, and the bowls used by passengers for the divestment of coins..."

But what you might ask are the 'consumables'? They are the swabs and traps that screeners use in conjunction with explosive trace detection technologies. The company supplies the trays used for carry-on baggage inspection, search gloves, calibration and verification pens, and the bowls used by passengers for the divestment of coins and pocket contents.

Morpho Detection's CTX5800

Additionally, DSA staff are able to offer airports training in the correct use of detection technologies and their maintenance.

DSA Detection basically provides a one-stop shop for all checkpoint needs, regardless as to the manufacturer of the actual equipment. Swift despatch is part of the service; all orders received by 5.30pm EST are shipped the same day from their Boston headquarters, Salt Lake City or London distribution centres.

The beauty of the business is its efficiency and simplicity. That's certainly not to say that the science behind the solutions proffered is lacking; rather the company has responded to a specific daily need for airport checkpoints, has negated the need for them to place orders and coordinate their delivery with multiple suppliers and has enabled the manufacturers to focus on what they do best – developing the detection and identification solutions – leaving DSA Detection to ensure that those solutions can be used effectively.

Morpho Detection:

Week two took me to California and the manufacturing plant of Morpho Detection's Computed Tomography (CT) solutions and former home of InVision, the first company to produce CT-based screening solutions for the aviation market. In fact, many of the industry's household names are today part of Morpho Detection, a business of Morpho, the Safran Group's security unit.

For readers benefit, and with thanks to Morpho Detection, we can clarify with this timeline of acquisitions how the company's range of solutions was developed:

- 1973: Ion Track Instruments founded (Trace Explosives and Narcotics Detection Technology)
- 1990: InVision, Inc. formed (CT Explosives Detection Technology)
- 1997: Invision acquires Quantum Magnetics, Inc. (Quadrupole Resonance Technology)
- 2002: GE acquires Ion Track Instruments
- 2003: InVision acquires Yxlon's XRD business (X-ray Diffraction Technology)
- 2004: GE acquires InVision, Inc.; GE Homeland Protection, Inc. formed (X-ray and Raman Spectroscopy Substance Identification Technology)
- 2009: GE's Homeland Protection business acquired by Safran Group in joint venture with GE; Morpho Detection, Inc. formed (Stand-Off Radiation Imaging Technology and Intelligent Personal Radiation Locator Technology)
- 2010: Safran Group integrates e-Documents, Identification and Detection businesses to create Morpho, a global security technology leader
- 2011: Morpho Detection, Inc. acquires Syagen Technologies, Inc. (Mass Spectrometry Explosives Detection Technology)

"...it is no exaggeration when Morpho claims screening to be like scuba diving within a bag..."

Morpho has more than 22,000 trace explosives and narcotics detection systems and almost 2,000 CTX EDS units deployed worldwide. With regards to CT technology, Morpho's latest products are the CTX 9800 DSi™ and the CTX 5800™.

The CTX 9800 DSi provides significant improvements in throughput capacity and introduces the Clarity Data Acquisition System, a high-resolution imaging engine which delivers high-definition 3D images of screened baggage. Certified by TSA in high-speed configuration, CTX 9800 can screen more than 1,000 bags per hour. The CTX 5800™ offers CT technology to airports where space or weight-restricted areas are a challenge. Utilising the same imaging quality as the 9800, the 5800 can still screen between 400 and 450 bags per hour. The image quality in both is truly

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remarkable and it is no exaggeration when Morpho claims screening with their solutions to be like "scuba diving within a bag".

X-ray diffraction (XRD) may well become the future gold standard in baggage inspection with its ability to define the molecular structure of the contents and identify specific threats. Morpho's team in Hamburg, Germany, is spearheading this area of the business and has developed the XRD 3500™ explosives detection system and the XDi™ checkpoint liquid explosives detection solution. Intended to be ready for demonstrations in the fourth quarter of 2012, XDi can automatically detect multiple liquid explosive threats in containers, meaning that passengers will not have to extract liquids from their bags for screening.

This April, the Israel Airports Authority (IAA) purchased additional CT and X-ray diffraction solutions from Morpho Detection in what has been labelled a "System of Systems". Consisting of an X-ray diffraction-based XRD 3500 EDS fully integrated with one or more CT-based EDS, Morpho Detection's System of Systems helps reduce false alarms and resultant manual inspections of bags. After a successful pilot test at Tel Aviv's Ben Gurion Airport of the system integrated in the airport's new baggage handling system, the IAA placed an order for additional System of Systems as part of phase two of their project.

Most recently, and since our visit, the TSA awarded Morpho Detection a five-year Indefinite Delivery/Indefinite Quantity contract for its medium-speed CTX 9800 EDS. Also this year, the Canadian Air Transport Security Authority (CATSA) selected Morpho Detection's Itemiser® DX desktop explosives trace detector (ETD) to help secure Canadian airports. Globally approved by five regulatory agencies, more than 3,000 Itemiser DX units have been sold worldwide since its introduction in 2009.

Unlike their key competitors at Smiths, L3 and Rapiscan, Morpho has opted not to develop its own advanced imaging technology (body scanner) as, in their view, such solutions only detect anomalies and still cannot identify explosives. For that reason, Morpho has invested in the development of the hand-held detector based on quadrupole resonance which will be able to detect explosives on the person, as opposed to the current magnetometers which can only detect metallic products.

Qylur:

Before we visited Qylur, we were told that we were going to see "something completely different" and a product that could potentially "revolutionise checkpoint screening". Could this be true or was it just an impressive marketing pitch?

Walking through Qylur's front door, one is greeted by the sight of a rather strange geometric form,

Qylur's Qylatron

easily mistaken for a piece of modern art. On the wall nearby is a framed sketch, drawn by the company's CEO Lisa Dolev, reflecting the same bizarre shape. The drawing was the vision and the geometric form its realisation; both were the Qylatron!

Dolev had felt that existing companies simply adapted security technologies to the mass transportation market. She felt that there had to be an alternative to the single conveyor belt solution with each X-ray system able to scan one bag at a time.

"...the Qylatron is the first fully automated self-service security checkpoint. The system scans bags in 15 seconds, but scans five bags at a time as there are five chambers in which passengers can place their own bags..."

Dolev's team, in California and Israel, developed the Qylatron as the first fully automated self-service security checkpoint. The system scans bags in several seconds, but scans five bags at a time as there are five chambers in which passengers can place their own bags. Each chamber has X-ray capability, combined with gamma radiation detectors and explosive trace detection technology.

The doors to each chamber are colour coded – a green door means it is open and the passenger can place their bag inside, whilst a red door shows the chamber to be occupied. The passenger scans their boarding pass, or other token, and the door of their choice (usually at their preferred height) opens. Whilst the passenger walks around the Qylatron, presumably via an archway metal detector, the bag is scanned. During the scan, standard explosive trace detection and X-ray analysis is performed. At the far end of the machine, if the bag is cleared, the door turns green. If an alarm is generated, it turns purple and remains locked until a screener resolves the cause of the alarm.

In effect, 5,800 ft2 of screening space had been reduced to 200 ft2 providing the same throughput as five standard security screening checkpoint lanes.

The Qylatron has also been built to potentially treat each bag it scans differently (e.g. some may not undergo explosive trace detection inspection) if the airport wishes to implement a risk-based screening system. The level of inspection would be determined by a code imbedded into the boarding card.

So, it must be cost prohibitive? No. Qylur's revolution was not only in the development of the screening system itself but also in the business model accompanying it. They are not planning to sell any of their machines, rather to charge users a price per scan. This they believe will not only make its deployment affordable, but will also negate the need for maintenance contracts; if the system doesn't work, Qylur won't earn any money.

Incidentally, Qylur takes its name from the Condylura Cristata - star-nosed mole - a functionally blind animal that uses its fleshy snout, surrounded by eleven pairs of pink appendages embedded with 25,000 sensory receptors, to detect and hunt its prey!

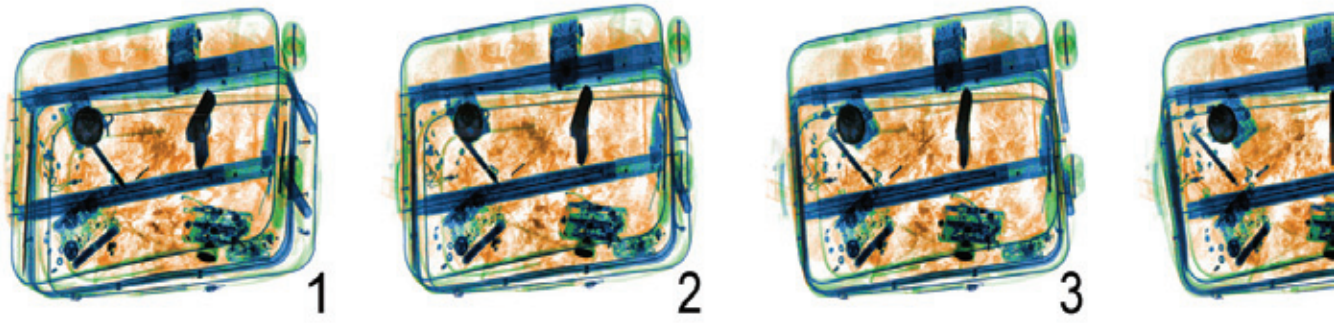
Delta Scientific:

Airport security tends to focus on screening and surveillance solutions, but perimeter protection is of equal importance. Delta Scientific was established in 1974 and took out the original patent for spike strips (alligator teeth) at car park exits. In the intervening years, the company has developed a range of traffic barriers, bollards, guard booths and sliding gates.

The US State Department is Delta's largest customer and, among airports, Delta provides runway access control barriers at Los Angeles International Airport and has deployments in Phoenix, Dallas-Fort Worth and New York's JFK.

With regards to the bollards and barriers, it is not the type of steel the company uses but rather the way in which they are installed; the foundations are key to ensuring a truly effective barrier system. Demand is also increasing for architecturally-pleasing bollards which beautify security deployments.

In one recent test a 65,000 lb truck was driven at a Delta barrier



at 50 mph; it was stopped dead in its tracks. Given the recent rise in incidents of vehicle-borne improvised explosive devices (VBIEDs) being driven by suicide bombers into airport facilities, it is that kind of resistance capacity that is now essential on airport approach roads and alongside terminal buildings.

"...a 65,000 lb truck was driven at a Delta barrier at 50 mph; it was stopped in its tracks..."

Astrophysics:

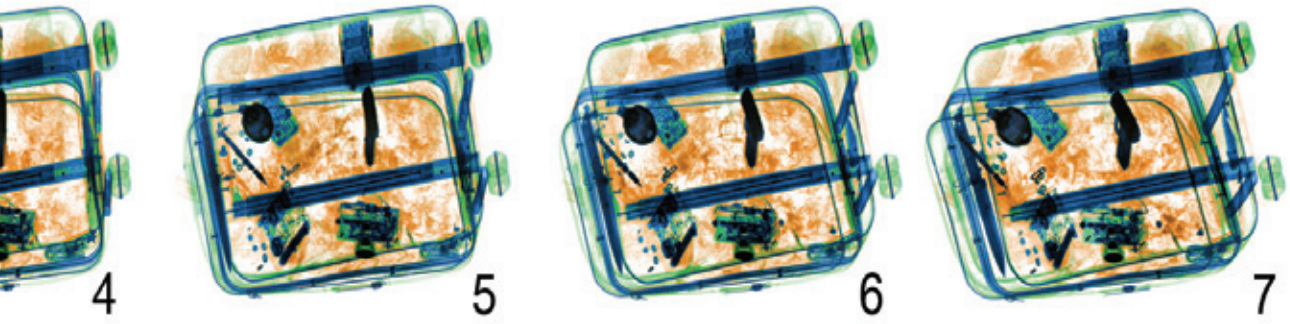
The name is well known in the world of X-ray inspection, albeit the company is relatively new. Astrophysics was founded in 2002 by Francois Zayek, a former Vice President at Perkin-Elmer EG&G Astrophysics. In the decade since the company's formation it has developed a full range of solutions with mail/small parcel, checkpoint, hold baggage, cargo and mobile inspection systems on offer.

Astrophysics' solutions are refreshingly operator-dependent in this world of, arguably, excessive automation and standard product configurations. For example, the entire Astrophysics range of X-ray solutions utilises a six colour palette to represent specific ranges of atomic numbers identified. Most other manufacturers use a three colour palette.

In 2011, Astrophysics was awarded a contract by the Department of Homeland Security for the development of a multi-view and CT-capable air cargo inspection system.

One of the latest products to have been developed is the VI7 with its seven detector arrays producing seven images. The resulting 'moving' seven images provide a sense of three-dimensional awareness, without the need to don

A Delta Scientific barrier in action.



"...the VI7 has seven detector arrays producing seven images. The resulting 'moving' seven images provide a sense of three-dimensional awareness..."

3D glasses, thereby improving the operator's ability to interpret images. The cost, however, is comparable with current checkpoint systems.

The VI7 technology augments current checkpoint screening and provides an upgraded capability midway between conventional X-ray systems and CT, and is receiving considerable interest as a more economic solution around the world.

HID Global:

HID Global products, solutions and technologies can be found at pretty much every airport in the US. After all, the company, originally called Hughes Identification Devices, has a very strong domestic focus. However, HID Global is actually a division of ASSA ABLOY, the Swedish lock manufacturer.

HID Global produces a broad range of access control solutions. Perhaps the most popular one developed is the iCLASS card, which incorporates RFID technology. However, the company has also recently launched innovation solutions that leverage near field communication (NFC) technology, which would enable an airport employee's mobile phone to become their access control token or device, as opposed to the traditional ID or other proximity card. One of the advantages of this technology is that most people become aware within minutes if they have lost their mobile phones, whereas a considerable period of time might elapse before they realise that their airport ID card has gone missing.

"...optical security media is used worldwide in major identity card programmes, including the U.S. Permanent Resident Card or Green Card..."

HID Global's LaserCard® optical security media is regarded as being one of the most tamper-proof and counterfeit-resistant ID credential platforms available. Engineered to meet sophisticated requirements for layered security, HID's optical security media is used worldwide in major identity card programmes, including the U.S. Permanent Resident Card or "Green Card".

Meanwhile, governments worldwide rely on FARGO ID Card Printer/Encoders - also being HID products - for the secure issuance of citizen IDs including drivers' licences and national ID cards, as well as employee and contractor badges. Options include single- or dual-sided card printing, single- or dual- sided lamination with high-security visual security elements, and encoding for contact and contactless smart cards, proximity and magnetic stripe cards

Tek84 Engineering Group LLC:

The unusually named Tek84 is a 10-person company that has a history of developing, and then selling, innovative aviation security technologies.

The first product was SentryScope™, a large scale surveillance system that covers a wide area and continually records all activity in ultra-high resolution. 300 units were sold, half of which went to the UK.

CastScope™ was an X-ray system specifically designed for the inspection of plaster casts, bandaged body parts and artificial limbs. The radiation dosage is one thousand times lower than medical X-rays. The vision was that every checkpoint should have a CastScope™ available and the TSA did purchase 35 systems which were deployed in 12 airports. However, the recent acquisition of advanced imaging technology to screen passengers has made the CastScope™ somewhat redundant.

The CarSCAN™ is a mobile drive-through vehicle inspection system that utilises dual-energy transmission X-ray technology. SAIC purchased CarSCAN™ from Tek84 in 2009.

The latest product is the Ait84 which is a combination backscatter/transmission X-ray body scanner. Tek84's President, Dr. Steven Smith, was actually the inventor of the Secure 1000 whole body imaging system currently being marketed by Rapiscan Systems. He was ahead of his time, developing the product back in 1992 and selling it to Rapiscan in 1998; the Ait84 is about half the size of the Secure 1000 and incorporates a four inch platform to ensure foot resolution.

"...the Ait84's image quality far exceeds that of the millimetre wave-based systems and the backscatter options on the market..."

The combination of backscatter and transmission eliminates the black background that has been a drawback of imaging systems utilising backscatter alone (and highlighted in the news earlier this year). Furthermore, the acquisition of dual mode images enables the Ait84 to effectively screen feet, turbans, casts, prosthetics and people wearing hijabs and burqas. The Ait84's image quality far exceeds that of the millimetre wave-based systems and the backscatter options on the market, yet regulators will probably demand that privacy filters be applied to systems deployed for passenger screening.

It is interesting to note that the Israeli Security Agency approved the Ait84 in August this year and it is the only whole body imaging solution that the security-conscious state has yet certified for usage at Ben Gurion International Airport. The Ait84 is now going to undergo testing by US government agencies.

One Resonance Sensors:

Last but not least, One Resonance Sensors. The company has been working on developing a bottle inspection system based on magnetic resonance which can determine the presence of liquid explosives and their precursors. The solution uses strong magnetic fields and emits a pulse of radio waves in order to generate a signal from the target, which can be interpreted and signal an alert to the screener if any hazardous substance is contained therein. Unlike Raman spectrometry, magnetic resonance inspection means that liquid threats can even be detected inside dark plastic or ceramic containers.

No attempt is made to actually ascertain what the target material identified actually is, but rather whether or not it is safe to transport.

There will also be no need for the system to scan a barcode in order to cross-check the signal with a library of chemical signatures; after all, not every bottle has one, especially since many passengers are having to decant liquids from larger bottles into smaller ones in order to comply with LAGs restrictions.

Philip Baum is the Editor-in-Chief of Aviation Security International.