ONE STEP AHI

Air cargo is essential to global sourcing, manufacturing and assembling and, without secure distribution, countries would suffer economically. But the combination of increased terror threat and criminal activity is a double blow for those dealing in the carriage of air cargo. Operating in such a landscape increases the need for greater security measures and the resulting technology needed to identify suspect packages before they are loaded onto the aircraft. Yet this must be played out against a backdrop of increasing financial and regulatory pressures faced by the air freight industry.

Freighters rely on security technology to keep their staff and cargo safe, yet is the technology keeping up with the rapidly changing security threat? You have to consider whether it is even possible to develop technology to counteract threats which have not yet happened. The watershed moment for the air cargo industry was the case in 2010 of the failed Yemen bomb plot, whereby two explosive devices were located within printer cartridges in planes en route to Chicago from Dubai and the UK. This case had a lasting impact on the way in which air cargo is screened, and impacted the regulations with which freighters need to comply. Four years on and this event still shapes security within the air cargo industry.

Those responsible for cargo operations face the challenge of managing the conflicting requirement of speedy cargo processing – in order to compete in a global market – versus the requirement to thoroughly investigate cargo for identifying security threats and contraband. Cargo screening is traditionally seen as a necessary bottleneck, but the latest technology offers a wide choice of solutions, high throughput and increased detection capabilities.

X-ray has a key role to play in the automatic detection of contraband substances. X-ray has been a part of the passenger travel and cargo security landscape for a long time, and it is easy to forget that the technology has, and is, evolving quickly to meet the changing security needs of freighters. Advances in image quality and software to detect contraband substances are generally behind the push towards greater detection abilities in X-ray technology. A new development within air cargo security screening has been the move to adopt technology traditionally used to scan hold baggage. Real Time Tomography (RTT), a revolutionary liquid explosive detection technology, is now being used to scan cargo after a successful rollout in a number of airports across the globe. Unlike traditional CT systems, the RTT features an innovative stationary gantry design that allows it to provide detailed 3-D images of the item being scanned at speeds of between 1,500 and 1,800 items per hour. Freighters have recognised the capital expenditure and security advantages of this system, and we expect RTT to

continue to have a positive impact on cargo inspection in the future.

One of the biggest challenges facing cargo security officers when screening for threats has been the ability to differentiate between benign materials and genuine harmful threat materials. As a result of this, in the past cargo inspections have been a costly and time consuming exercise for security staff, leading to high false alarm

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"Today's sophisticated X-ray systems can identify the actual chemical makeup – even the atomic number – of objects that have been screened"


rates and a slow throughput. Today's more sophisticated X-ray screening systems can identify the actual chemical makeup – even the specific atomic number – of objects that have been screened. By analysing the X-rays that are reflected by each target object, its chemical makeup can be discerned and a much more accurate and specific identification of narcotics or explosive material is possible. This improves performance, reduces false alarms and ensures that throughput is not slowed down. New research and the development of advanced detection algorithms means security officials can now automatically detect contraband substances, such as undeclared lithium batteries, with just a simple software update. Alongside the UK CAA, the screening industry has been working to develop a rules-based system to detect substances which are not necessarily picked up by traditional X-ray. Batteries are a key example of this grey area, as are contraband cigarettes, which can now be detected by software which scans for nuances in the images on the packets themselves. Although this is a simple process, it is lengthy, so the fight is really on to develop software which keeps up with the criminal processes used to disguise contraband goods in cargo.

A further regulatory-approved method for screening for narcotics is using a method called trace detection. Similar to its counterpart in the explosives market, this enables a screening system to use non-contact inhalation sampling technology to detect narcotic traces in both forms of vapours and particulate from the ambient environment, packages, or other surfaces that may have absorbed any residue. This method enables screeners to quickly identify harmful materials without having to make direct contact or damage the packaging or surrounding surface. This technology has now evolved into hand-held systems which can be deployed across border control, airports and events.

In order for the detection process to be as cost effective as possible, there has also been a trend towards automation. Once the security process is automated your throughput can increase, and it is much more feasible to scan and inspect every single piece of cargo before it is loaded onto the aircraft. Once you incorporate off-site, centralised checking systems, you also gain the advantage of lessening the potential for corruption, as inspection

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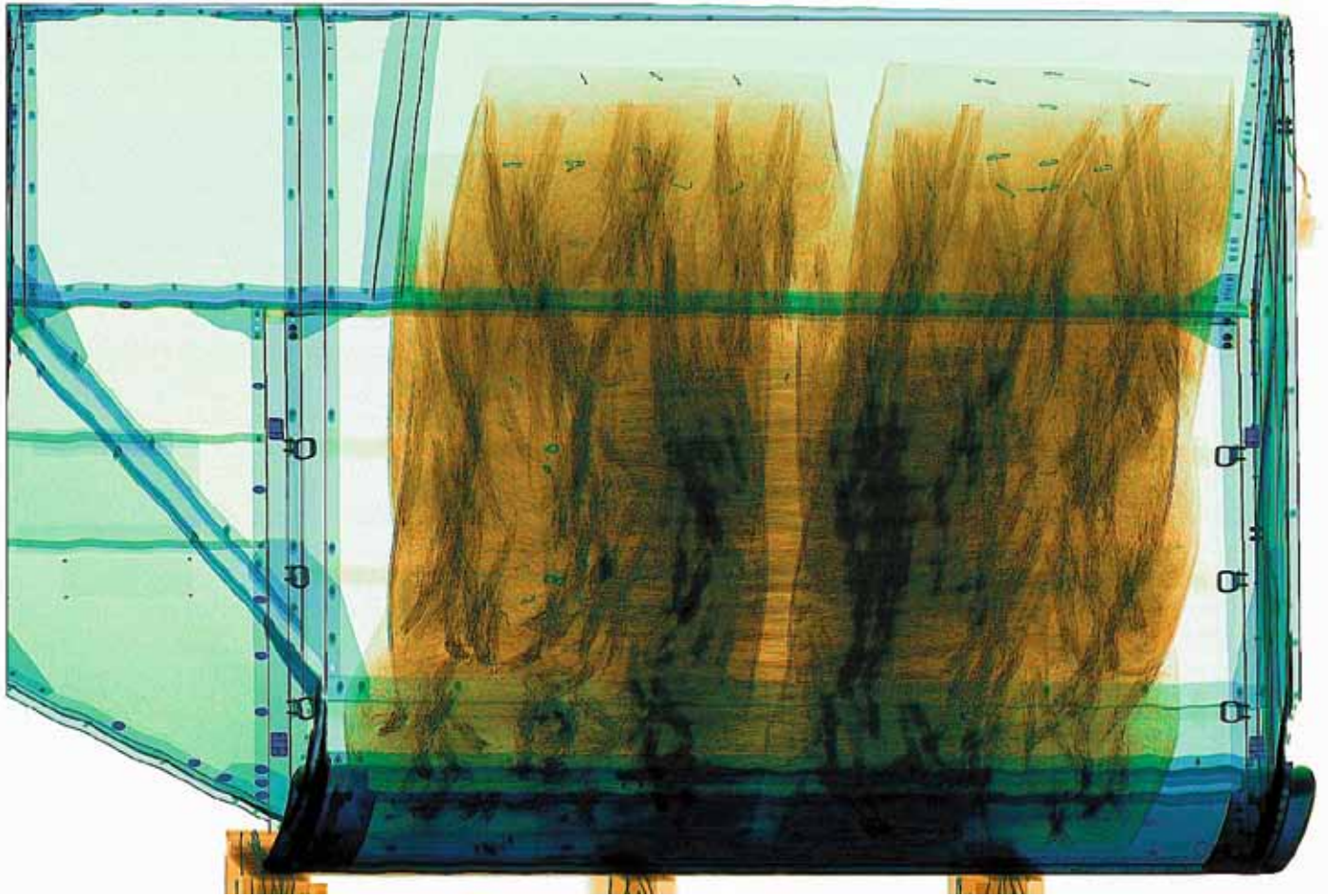
officers are removed from the physical location of the cargo. This approach also benefits from the cost-saving of centralised control of the entire cargo screening process.

An additional threat which security technology must take into account is that of radioactive substances. These materials have the potential to cause significant harm and must be screened for with just as much caution as explosives, especially due to their propensity to be shielded which makes them nearly invisible to conventional radiation detectors. In the wrong hands radiation is, at best, a contamination threat that can force important infrastructure like airports to shut down. At worst, foreign and domestic terrorist groups can use these materials to create weapons of mass destruction, from dirty bombs to much, much worse. With this in mind, finding these potential threats is a high, if not the highest, priority for security screening personnel. Advances in radiation and nuclear (rad-nuke) screening technology and "traditional" X-ray screening have made it possible to integrate the two operations into a single checkpoint, allowing operators to pinpoint conventional threats or contraband within cargo while simultaneously detecting radioactive materials.

Keeping up with regulatory changes can also be a major headache for cargo handlers. On 3 December 2012, the Transportation Security Administration (TSA) implement its 100 per cent air cargo deadline, which fell in line with the 9/11 Commission Act that enforced all cargo transported on a passenger aircraft to be screened for explosives. This regulation came as a direct result of the 2010 Yemen bomb plot. In 2014 we have seen the introduction of the

European Union's ACC3 regulation, which came into force in July. The ACC3 regulations, which affect the operations of all inbound air mail and cargo into the EU market, is designed to ensure the appropriate screening and validation of cargo entering the EU from any third country airport (ACC3s) has been carried out in accordance with aviation security screening procedures.

A secure supply chain, as mentioned with the ACC3, has to be at the very top of the agenda for air cargo carriers. Cargo, carried by air, has most likely been developed by a host of different modes of transport from rail to ship and road. The whole inter-connected supply chain must have the capability to detect threats while simultaneously ensuring that throughput is high and the global supply chain is not affected by the scanning process. Significant advancements have been made within the security scanning of rail, road vehicles and containers bound for sea which can now undertake inspection of rail carriages on single and dual tracks, multi-direction carriages and vehicles of all sizes.

The on-going threat to air cargo security is one that we are likely to have to face for many years. Every new threat brings new challenges and a threat usually only becomes clear after the attempt, so security technology will nearly always be on the back foot. As a result, the security measures of the future not only have to anticipate and contend with these emerging threats, but need to combine the best screening technologies with advanced integrated solutions which apply to the entire global supply chain to strengthen the first line of defence.

What lies within: X-ray has a key role in detecting contraband inside cargo

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