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Introduction to Tomographic Explosives Detection Systems & Baggage Handling Systems: Technologies & Market



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Homeland Security Research Corp.

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Table of Contents

1	Key Facts.....	4
2	Conclusions	9
3	Luggage Screening Technologies	10
4	Global Tomographic Explosives Detection Systems Market – 2014-2020	10
4.1	Explosive Detection System Related Sub-Markets.....	10

List of Figures

Figure 1 - A Checked Baggage Inspection System that Includes a Baggage handling System (BHS) with three in-line EDS Machines.....	4
Figure 2 - Luggage Screening in the Ensemble of Airport Security Infrastructure.....	6
Figure 3 - Airport Multi-Layered Security Infrastructure	7
Figure 4 - Worldwide Distribution of Terroristic Events on Airports 1968 - 2007.....	8
Figure 5 - Types of Airport Attack Weapons Used.....	8

1 Key Facts

- ❑ The global market in aviation security presents EDS vendors with growth opportunities stemming from the booming Chinese airport security market, the new European Union mandated enhanced detection standards and the upcoming global replacement cycle which begun by 2012
- ❑ Most EDS and BHS systems are installed at airports, some are installed in secured facilities & buildings, public gathering sites and land transportation checkpoints.
- ❑ EDS and BHS systems capacity installed at airports have to meet the peak demand during holiday seasons. The volume of passengers and checked baggage increase exponentially, resulting in the issuance of heightened threat levels
- ❑ Post warranty service, upgrade and refurbishing business constitute more than 40% of the industry revenues and 50-75% of its net profit.
- ❑ There are 1640 cargo and scheduled passenger flight airports in 175 countries worldwide – ranging from large, international hubs to small, rural airports. The aviation industry forecasts (e.g., Boeing, Airbus) that by 2025, the number of passengers will triple to more than 9 billion worldwide.

Figure 1 - A Checked Baggage Inspection System that Includes a Baggage handling System (BHS) with three in-line EDS Machines

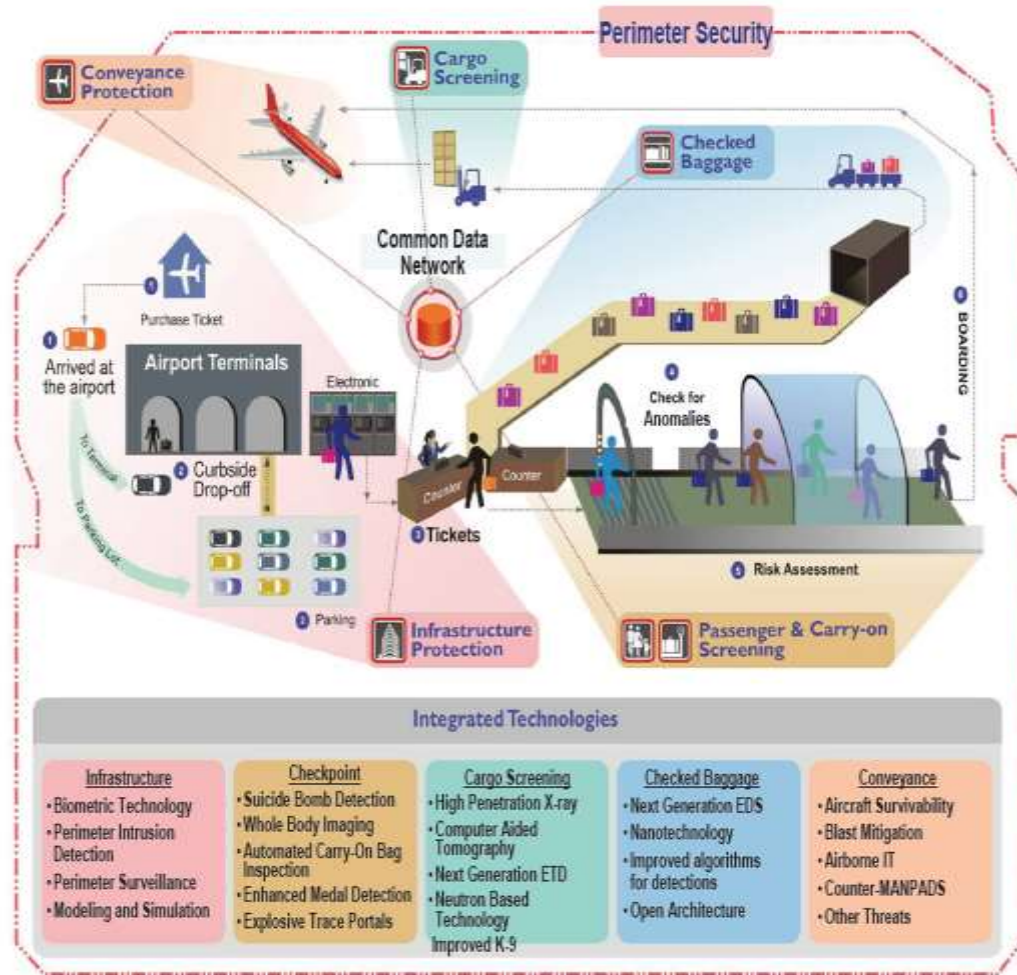


Source: GAO.

- ❑ There are over 6,500 scheduled airline passengers screening lanes worldwide.
- ❑ On average, each airline passenger carries 0.8 to 1.2 cabin bags, and 0.5-2 checked luggage items, depending on the type of passenger (domestic, international, business or leisure).
- ❑ The Obama administration is committed to accelerate the development of next generation EDS.
- ❑ Six companies dominate EDS systems sales, service & upgrade sub-markets – Morpho Detection (previously InVision and GE-Security EDS product lines), Analogic, Reveal, Nuctech, AS&E and L-3.
- ❑ The Baggage handling system (BHS) market, which constitutes the lion's share of the EDS based airport screening systems, is dominated by over 100 local contractors.
- ❑ The recent successful testing, evaluation and operation of the Israeli Tel-Aviv airport authorities which augment high throughput EDS with Tomographic Coherent X-ray is a clear indication of a trend toward a bi-modal checked luggage global market.

The following figure presents luggage EDS screening in the ensemble of airport security infrastructure.

Figure 2 - Luggage Screening in the Ensemble of Airport Security Infrastructure

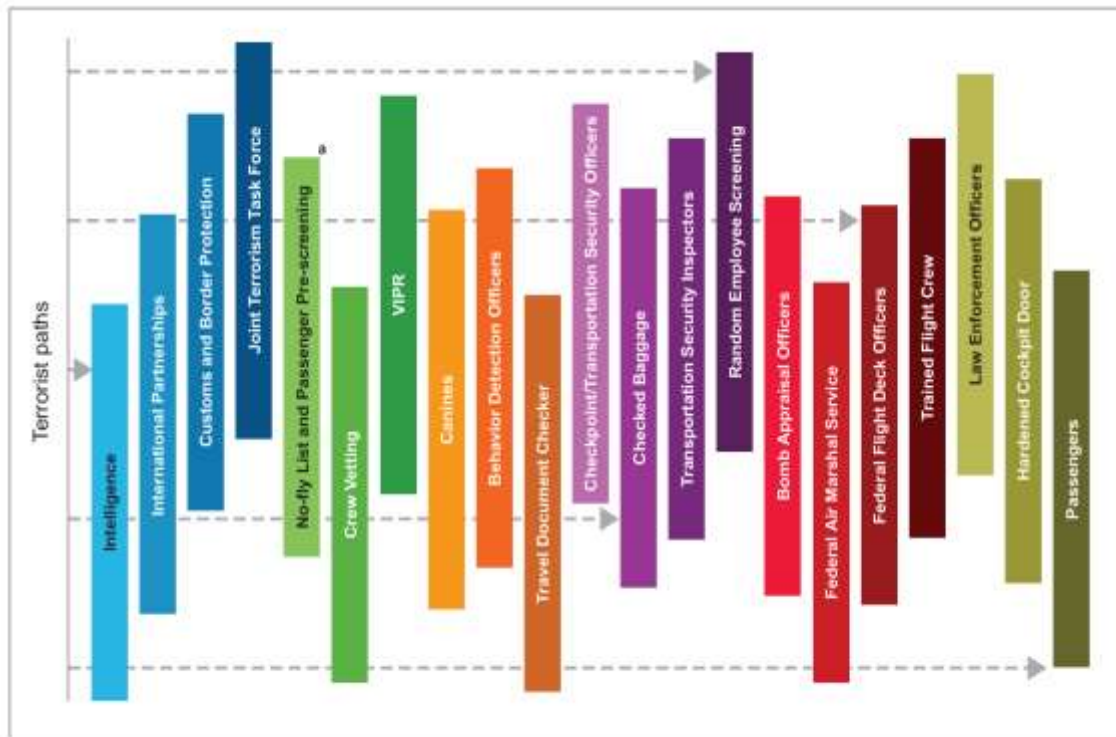


(Source: DHS)

- ❑ According to the AAPA and HSRC, Aviation security costs the air transport industry and governments more than \$22 billion per annum.
- ❑ TSA estimates that the U.S. EDS and BHS programs will cost close to \$50 billion through 2030
- ❑ The International Civil Aviation Organization (ICAO) indicated that airlines of its 190 Member States handled 2.7 billion passengers in 2011, a 5.6% year-on-year increase in 2010.

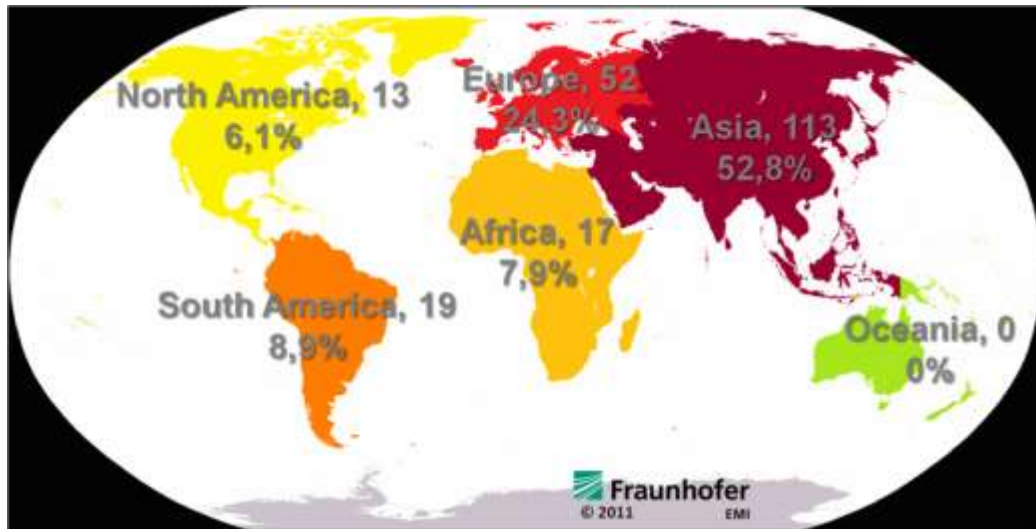
- ❑ The Airports Council International (ACI) reported that 5.4 billion passengers (including departures and arrivals) passed through its 1,345 member airports worldwide – an increase of 8.0% over 2010.
- ❑ The European Union has implemented a rigorous technology certification process, and is requiring European airports to implement significantly improved checked luggage technology, starting September 2014.

Figure 3 - Airport Multi-Layered Security Infrastructure



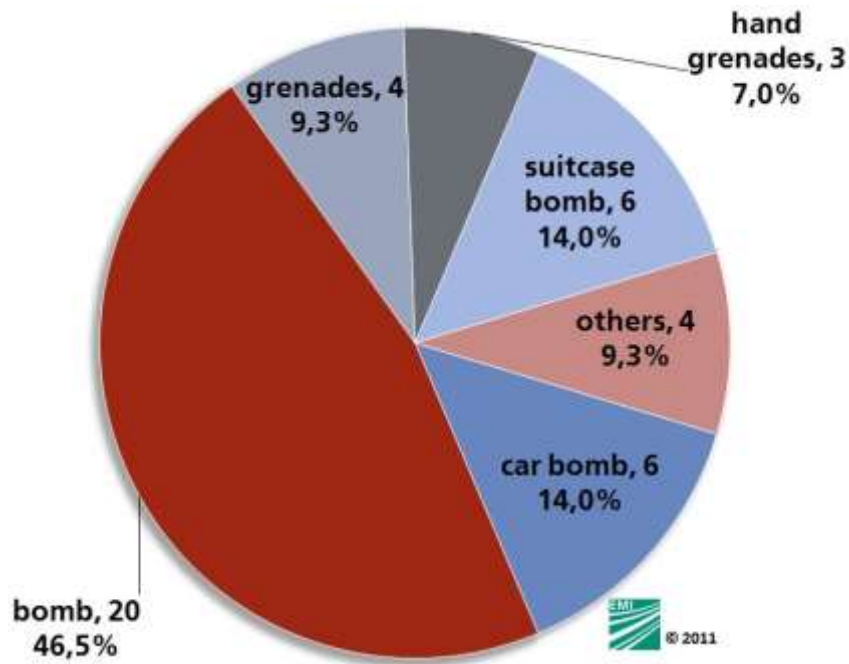
Source: TSA.

Figure 4 - Worldwide Distribution of Terroristic Events on Airports 1968 - 2007



- ❑ Terrorists are unlikely to fade away and seem intent on developing new and more inventive ways of disrupting the society. Their intents however, do not justify the blind application of restrictive security measures that impede commerce.

Figure 5 - Types of Airport Attack Weapons Used



(Source: Fraunhofer)

- ❑ EDS has a limited performance in explosives detection. Since 9/11, terrorists have developed advanced threats using liquid and plastic explosives that do not have recognizable shapes or densities. These explosives can be poured into bottles, molded into baggage walls, made like shoe soles or shaped to look like laptop computer batteries hidden in the cluttered content of screened luggage or in baggage and containers that can slip through EDS inspection. Coherent X-ray spectroscopy technologies can overcome these limitations.
- ❑ The current (March 2014) global installed base of EDS screening systems includes over 3000 systems. Most systems are installed at airports.
- ❑ The threat and fear posed by potential suicide bombers is real, persistent and likely to stay. It will continue to be the key to market development.

2 Conclusions

- ❑ The EDS market surge may be ebbing in the United States, and EDS vendors, are increasingly looking abroad to sell their products as well seeking ways to improve existing systems to deal with travelers' most common request, "make the screening process faster".
- ❑ The EDS technology is currently in a mature stage and the objective now is how to keep or increase revenues while trimming costs.
- ❑ Vendors must deliver EDS today, and to avoid obsolescence they must add to the upgrade libraries of explosives EDS can detect.
- ❑ Due to the demand for cost-effective high throughput systems, the cost of EDS products will remain high, and possibly climb higher in some market sectors (e.g., large airports), while the cost per single item screening will decline.
- ❑ Airports are faced with growing security regulations and an increased demand to clear passenger checked luggage and cabin baggage, yet at the same time need to manage costs and streamline the airport experience for huge volumes of passengers.
- ❑ Embedded software will be developed to simplify the operator interface, reduce training time and costs and minimize the "human" overlooked threats factor in assessing the presence of a potential risk.
- ❑ Lack of sufficient training of EDS operators is a key concern. HSRC forecasts a growth in the training market.
- ❑ The threat and fear posed by potential suicide bombers is real, persistent and likely to stay.

- ❑ The EDS industry has an urgent need to “develop or perish” - come up with a new generation of high throughput, large bore and semi-automated screening systems.

3 Luggage Screening Technologies

Explosives detection technologies have not advanced much since the 1990s, when computerized tomography explosives detection systems made their debut. Modifications such as the introduction of Dual Energy EDS did little to improve overall threat detection performance. On the other hand, the reliability and throughput of EDS systems improved dramatically since 9/11.

Most luggage and air-cargo screening technologies suffer from inherent shortcomings including:

- ❑ Multiple potential targets (i.e., mass transport, office buildings) cannot be accommodated with today's technologies (slow, expensive to operate)
- ❑ High rate of false alarms
- ❑ High rate of overlooked threats
- ❑ Dependence on operator performance
- ❑ Limited CBRN detection
- ❑ High cost of EDS screening infrastructure

4 Global Tomographic Explosives Detection Systems Market – 2014-2020

4.1 Explosive Detection System Related Sub-Markets

There are several tomographic EDS-related Sub-markets:

- ❑ **EDS equipment market** – sales of systems for luggage screening, air cargo screening and other purposes.
- ❑ **EDS installation market** – relates to the set-up and preparation of equipment for use. The costs depend on configuration: EDS installed in a stand-alone configuration will cost significantly less than the same unit installed in a multiplexed arrangement.
- ❑ **Baggage handling system (BHS) market** – a sizeable EDS-related market, which represents the majority of the upfront costs associated with implementing an in-line EDS. EDS require significant facility construction

costs because of their size and weight and the need to integrate them into the BHS.

- ❑ **Refurbishment and upgrade market** – The assumption is that upgrade and refurbishment options, add an additional four years to a machine's life (refurbishment extends a machine's useful life, whereas an upgrade provides extended performance).
- ❑ **EDS service market** – includes preventive and corrective service, parts, shipping and handling and technical update training.
- ❑ **Handling system service market** – includes preventive as well as corrective service to all BHS components.

More information can be found at:

Tomographic Explosives Detection Systems – EDS & BHS: Industry, Technologies & Global Market – 2014-2020