NEXT GENERATION EDS CT SYSTEMS

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Background & Current Systems

- Automated Explosives Detection Systems for Aviation prompted by Pan AM 103
- Design Genesis Medical CT

- An important Distinction:
- Aviation EDS CT has a significantly higher duty cycle. 400 bags per hour with newer systems 800 to 1000 bags per hour.

- Excellent Reference material
- National Academies Press 1998 (Configuration Management and Performance Verification of Explosives-Detection Systems)
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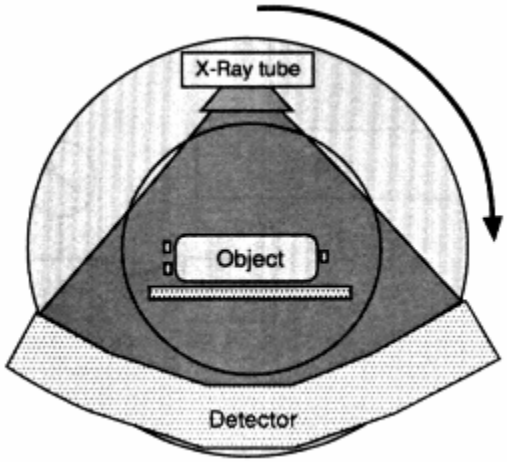
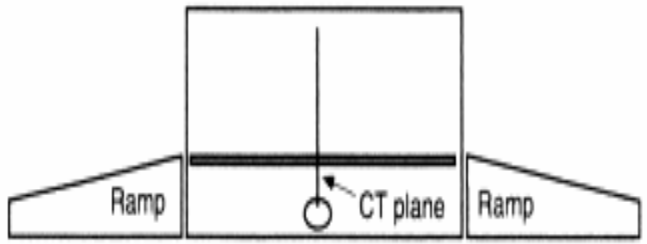


- Side view as a standalone System

- Optimal Configuration as an inline System with the Airport Baggage Handling System



- Limited Deployment in pre 911 plans
- Deployment by Airlines for limited screening

- Post 911 with passage Of ATSA Nov 19 2001, 100 percent screening of checked luggage

- Design dictated by the need for very high detection rates and 3 to 400 bags per hour throughput, speed of the rotating gantry, and the belt influenced the resolution and the size of the volumetric voxel under inspection

- Basic technology driven by Xray Source

- Detection based on density discrimination in a similar fashion to cancer detection. Unlike Medical CT, shape is never considered in detection.
- CT EDS systems are very effective at Detection and approaching optimal conditions.

RDT&E Efforts

- The testing and Certification Efforts at the Transportation Laboratory has developed a mature and effective process, that has resulted in a greater improvement in reliability and service levels with improved detection levels.

Next Gen EDS Drivers

- Overall Guiding Principle is based on Best Value and Affordability

- There is a significant data collected over the past few years on O&M costs
- Reduce Capital Acquisition Costs
- Installation Costs
- Field maintenance Costs

- False Alarm Rate Reduction has significant impact on operational costs, all alarms must be resolved and requires some sort of manual inspection, adding to labor and other system costs.

- A major distinction between Medical and Security systems can be traced to two factors.

- Passenger bags vary significantly both in size and content with huge clutter and many layers of material with varying densities and textures.

- Threats do not have unique density values and share the domain space with many harmless and innocuous substances

Next Generation Design goals

- Promotion of standards at various interfaces to reduce reliance on proprietary designs.

- Attempt to segregate the hardware from the Detection Algorithm, (not unlike implementation of the DNDO Advanced Spectroscopic Portal), Implement Image Standards, similar to medical CT

- Consideration of Non Rotating gantry designs with novel X-ray sources. Instead of a single source rotating at high speed, multiple sources, preliminary designs upward of 500 to 900 sources distributed in a circular fashion.
- Investigate the benefit of increased resolution through source characteristics and detector arrays.

- Investigate novel x-ray sources such as Nanotube technology with longer lifetime and lighter source assemblies and facilitate the use of dual energy for threat discrimination. Commercial units are likely end of CY07. Promise of significant lifetime and reduced costs, reduction in AC requirements.

- Investigate inclusion of add on Technologies which derive a chemical composition discrimanants, such as Coherent X-ray, where collected spectra relate to the individual chemical composition of a threat. Promising preliminary systems are in service.

Why Emphasis on False Alarm Reduction

- Although algorithm improvements have reduced the false alarm rates for current CT technology, rates exact an operational cost that can and should be reduced.
- Novel threats, such as Home made explosives and liquid explosives, often with a wide range of density and physical characterisitics, can lead to a significant increase in False Alarm rates

2007 versus 2001

- TSA has a mature and capable operation to collect and analyze operational data for a comprehensive life cycle cost management not available in late 2002 as CT EDS systems were deployed.
- Technology Advances in both material and Software with a larger pool of prospective developers with interest to compete for the Next Gen System Deployment.