TSA’s Commercial Aircraft Testing & Application to Threat Mitigation Training

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• TSA (FAA) Aircraft Hardening & Threat Mitigation Program Overview

• Commercial Aircraft Vulnerability Testing

• Threat Mitigation Concepts/Products
  ➔ Hardened Unit Load Device (HULD)
  ➔ Threat Containment Unit (TCU)

• Summary
• Program Objectives:

- Validate Detection Standards in Terms of Commercial Aircraft Vulnerability (What is the Minimum Size Explosive that Must be Detected?)

- Develop & Evaluate Techniques which Minimize the Effects of Threat Events on the Aircraft

- Assess other Threats to the Aircraft such as Electromagnetic Interference, Projected Energy, Missiles, etc.
• **Explosive Vulnerability Assessment**
  - Wide and Narrow Body Aircraft
  - Checked and Carry-on Luggage, Cargo & Mail

• **Explosive Mitigation**
  - Passenger Compartments
  - Cargo Compartments
    - Hardened Containers

• **Advanced Threats**
  - Vulnerability and Mitigation
L-1011 TEST (JAN ‘98)
• **Over 100 Tests Conducted on Commercial Aircraft Type Structures since 1992**
  - Testing has led to EDS Standard Validation & Evolution
  - Validation of Least Risk Bomb Location (LRBL) Procedures on Certain Models of Aircraft
  - Key Findings Shared with Commercial Airframe Manufacturers

• **Over 50 Supporting Data Tests**
  - Characterization of Properties of Luggage on Explosive Effects
  - Characterization of LD-3 Containers on Explosive Effects
  - Characterization of Fragmentation
• Over 50 Tests Conducted on Full-Scale Blast Mitigation Prototypes Since 1990

• Investigating a Number of Explosive Mitigation Concepts including:
  ⇒ Hardened Unit Load Devices (HULDs)
  ⇒ Threat Containment Units (TCUs)
HARDENED UNIT LOAD DEVICE (HULD) PROJECT
• **Goal:** Assess the Structural and Functional Readiness of Hardened Container Designs and Investigate both the Operational and Cost Effectiveness of Implementing Hardened Containers as a Security Measure.

• Initiated as a result of the Aviation Security Improvement Act of 1990

• Two Current Manufacturers (Telair and Galaxy Scientific) have Designs that Satisfy Both TSA (Security) and FAA (Airworthiness) Requirements

• Key Issues are Unit Tare Weight, Cost & Maintainability
COMPARISON STANDARD/HARDENED (SIDE DOOR)
Galaxy Prototype Unit  

Telair Prototype Unit
THREAT CONTAINMENT UNIT (TCU) PROJECT
• Designed to Safely Contain the Detonation of an Improvised Explosive Device (IED) Inside a Piece of Passenger Luggage

• Intended for use in Conjunction with Explosives Detection Equipment for Passenger Luggage Screening at Airports
• Capable of Containing the Detonation of a Specified Mass of C-4 Explosive with a Safe Standoff Distance for Personnel of 2 Feet
For Operational Use, the TCU is Mated to a 2 Piece Transport Conveyance Consisting of a Terminal Cart (for Inside the Airport) and a Road Cart (to allow for Transport of the TCU over the Open Road)
TCU DOOR EVOLUTION

• Simple hinges
• Eight pin closure operated by hand
• Plug unattached
• 1st Deployment

• Simple hinges
• Eight pin closure operated by bell crank mechanism
• Plug unattached
• 2nd & 3rd Deployments

• Complex hinge for full 180° opening
• Eight pin closure operated by bell crank mechanism
• Plug attached to door
• All current deployments
• TCU Project an Excellent Example of Interagency Cooperation:

  ✔ TSA Security Technology Deployment Office – Provides Funding, Prioritizes Installation Sites, Provides Installation POCs

  ✔ Aircraft Hardening Program – Established Design Requirements, Incorporation of Design Enhancements/Modifications, Interface with STDO/LEO’s/EOD, Assist DOD in TCU Installations & Training

  ✔ Naval Surface Warfare Center Survivability and Weapons Effects Department (NSWCCD) – Design of TCU, User Manuals and Installation/Training

  ✔ US Army Aberdeen Test Center (ATC), Survivability/Lethality Core – Manages IA with TSA, Fabrication on TCU and Terminal Conveyance

  ✔ Naval Air Warfare Center (NAVAIR), Aircraft Division Marine Operations and Targets – Fabrication of Plastic Components and TCU Road Cart, Foaming of TCU Interior, Painting of TCU/Conveyances, Preps and Ships TCU, Maintains Configuration Control Documentation

  ✔ TSA Explosives Unit/Civil Law Enforcement Bomb Squads – Provide Operational Input for TCU Design Development/Improvement
• Program is Testing-Centered with Transportation Security-Critical Mission
• Vulnerability Work allows Identification of Measures/Criteria for Prevention (Screening) and Mitigation
• Validation of LRBL Protocols allows for Refinement of Training Procedures for Flight Crews
• Several Mitigation Products Developed by Program, Threat Containment Unit a Good Example of Testing & Training Tie-in