



Security

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

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22 August 2002

5th Annual NDIA Testing & Training Symposium

Orlando, Florida



- **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**



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Aircraft Hardening & Threat Mitigation

- **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.**



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Aircraft Hardening – Program Structure

- **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**



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Aircraft Hardening – Explosive Vulnerability

L-1011 TEST (JAN '98)





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Aircraft Hardening – Explosive Vulnerability

- **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**



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Aircraft Hardening – Explosive Mitigation

- **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)**



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Aircraft Hardening – Explosive Mitigation

**HARDENED UNIT LOAD DEVICE (HULD)
PROJECT**



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Aircraft Hardening – Explosive Mitigation

- ***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***



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Aircraft Hardening – Explosive Mitigation

**COMPARISON STANDARD/HARDENED
(SIDE DOOR)**





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Aircraft Hardening – Explosive Mitigation



Galaxy Prototype Unit



Telair Prototype Unit



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Aircraft Hardening – Explosive Mitigation

**THREAT CONTAINMENT UNIT (TCU)
PROJECT**



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Explosive Mitigation - TCU

- **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**





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Explosive Mitigation - TCU

- **Capable of Containing the Detonation of a Specified Mass of C-4 Explosive with a Safe Standoff Distance for Personnel of 2 Feet**





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Explosive Mitigation - TCU

- **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



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Explosive Mitigation - TCU

- **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**