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DHS Science and Technology Directorate

Explosive Threat Mitigation Unit (TMU): Portable, Cost-Effective, Blast Mitigation for Small IED Threats

Customer Challenge

In 2014, a DHS component had an urgent requirement for a light weight, low cost, portable, explosive mitigation device which could be located at any one of a wide variety of their security screening checkpoints. In response to this requirement, DHS S&T's Commercial Aircraft Vulnerability and Mitigation Program initiated the Explosive Threat Mitigation Unit (TMU) project, conducted with support from S&T's Transportation Security Laboratory (TSL).

The objective of the TMU project is to provide the DHS customer with safe, secured storage of items obtained from visitors passing through a security checkpoint in the event that an item contains an explosive-based threat.

Unconfined Improvised Explosive Device (IED) detonation

Technical Approach

Working in close coordination with the DHS customer, DHS S&T developed a series of operational requirements that the TMU would need to meet in order to satisfy customer needs. TMU Design requirements included:

- Ability to safely mitigate blast damage mechanisms (e.g.; overpressure, fragmentation, post-detonation combustion) for a range of customer-specified IED threats.
- Secure suspect item within TMU <60 seconds
- 1-Man portability with 2-man lift capability in operationally deployed condition.
- Small footprint (< 4'L x 3'W x 4'H), low tare weight (<120 lbs.), low-profile design
- Seamless integration with existing security protocols
- Acquisition cost <$50K/unit

Project Execution/Outcome

The TMU was designed by the US Army Research Laboratory (ARL) under an interagency agreement with S&T. The project takes advantage of ARL's extensive knowledge and expertise in the areas of: blast response of advanced composite materials/structures; modeling and simulation of blast and ballistic resistant material; and design and development of personnel and vehicle protective armors combined with extensive DoD/Aberdeen Test Center live-fire test capability and experience. TMU development was accomplished via an iterative approach between live fire testing and modeling/simulation. The finalized TMU design in- corporates innovative operational features in conjunction with use of advance composite materials that provide a light weight (117 lb.), low cost ($30K), operationally mobile (man portable) blast/fragment containment device.

TMU Design with Parcel Loading Door Open (Left);
TMU Prototype Response during Internal Blast Event (Right)

Project Milestones/Accomplishments

- Project Commencement, June 2014
- TMU Prototypes Development/Testing, December 2014 – December 2015
- Finalized TMU Design/Proof Test, March 2016
- Delivery of TMU Pilot Units, May 2016

Project Performers (Roles/Responsibilities)

- DHS S&T TSL (Requirements Development, Test Planning/Execution, Blast Effects/Mitigation Subject Matter Expertise)
- US Army ARL, Weapons and Materials Response Directorate (TMU Design Development, Fabrication, Blast Response Modeling and Simulation)
- US Army ATC, Survivability/Lethality Directorate (Fully Instrumented Live Fire Testing)

Homeland Security
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To learn more about the Explosive Threat Mitigation Unit Project, contact SandT.Explosives@hq.dhs.gov

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