# Fabric Structures Team Overview

## Title and Subtitle
6th Bi-Annual DOD JOCOTAS Meeting with Rigid & Soft Wall Shelter Industry & Indoor & Outdoor Exhibition, 2-4 Nov 2009, Panama City Beach, FL

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- a. Report: unclassified
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Same as Report (SAR)

## Number of Pages
22
• Jean Hampel - Team Leader, Mechanical Engineer
• Stephanie Enos - Admin support
• Tom Larkham - Equipment Specialist
• Kristian Donahue - Chemical Engineer
• Robin Szczuka – Chemical Engineer
• Julia McAdams – Chemical Engineer
• Liz Swisher – Electrical Engineer
• Chris Aall – Mechanical Engineer
• Clinton McAdams – Mechanical Engineer
• 100% Customer Funded
• No Shelter S&T Funding Line
• Funding Sources
  • Joint Science & Technology Office, Defense Threat Reduction Agency
  • Joint PM-Collective Protection, JPEO-Chem Bio Defense
  • Army Medical Department
  • Defense Logistics Agency
    – Congressionals
    – SBIRs
Current Research Areas

- **Shelter Technologies:**
  - Airbeam Shelters:
    - Maintenance Shelters
    - Mobile Warehouses
    - Large Command Posts
    - CB Medical
    - Backpackable
  - Insulation & energy
    - Aerogel insulation
    - Cellular insulation
    - Radiant Floor Heating

- **Collective Protection – CB Defense:**
  - CB Hangars/Decon Shelters
  - Reactive Airlocks
  - Self-Decontaminating Fabrics
  - Battlefield Contaminants Test Methods
  - Family of Col Pro Shelters
  - Col Pro for Military Working Dogs
Airbeam Technology

- Provides Rapid, Lightweight, Durable Deployment
- Technology transitioned to Force Provider (HDT-Vertigo, Inc.) and Chemically and Biologically Protected Shelter (Federal Fabrics-Fibers, Inc.)
- New congressional program for airbeam backpackable shelters
2nd Generation Aviation Maintenance Shelter Demonstrated in July 09

- Designed and fabricated by Hunter Defense Technologies/Vertigo Shelters (prime), Johnson Outdoors (subcontractor)
- Congressionally Directed Effort
- FST POC: Liz Swisher

Interior Dimensions
- Floor Space: 83 ft × 147 ft
- Area: 10,600 sq ft
- Height: 34 ft
- System Weight: 18,500 lb
- Pack Dimensions: Two 20-foot ISO
- Number of AirBeams: 7
- AirBeam Working Pressure: 60 psi
- Snow Load: 20 psf
- Wind Load
  - Steady: 90 mph
  - Gust: 110 mph
- Set-up Time
  - Under Canopy: 16 hr
  - Full Operational Capability: 24 hr
- Set-up Personnel: 8
• 5-airbeam version of 2nd generation Aviation Maintenance Shelter transitioning to Joint Strike Fighter Decon Shelter Program under Joint Program Manager – Collective Protection

• Production Products developing technology for CB liner under congressional program

• FST POCs:
  • Tom Larkham
  • Robin Szczuka
  • Liz Swisher
Airbeam Large Command Post

- 44 ft (w) × 58 ft (l) × 23 ft (h) Five AirBeam SuperSTAT

- Prototype demo’d first time here at JOCTAS, HDT-Vertigo, Inc. area

- FST POC: Liz Swisher
• 44 ft (w) × 143 ft (l) × 23 ft (h) Twelve AirBeam SuperSTAT
• Currently under development for Defense Logistics Agency
• FST POC: Liz Swisher
Small Airbeam Shelter Improvements

- Fit, form and function study on CB liner for field hospital
- Affect of CB agents on airbeams
- Advanced insulation – aerogel, cellular honeycomb
Next Generation Backpackable Tents

• Primary Objective - high performance backpackable tents with reduced weight and cube

• Congressionally directed program with Nemo, Inc., Nashua, NH

• Designs include novel inflatable airbeam technology and tensioned fabric/pole configurations

• FST POC: Chris Aall
• Aspen’s aerogel blanket consists of amorphous silica with extremely low conductivity, incorporated into a flexible form.

• In direct fuel consumption testing of two 20’ x 21’ airbeam tents, the aerogel lined tent consumed 34% less fuel over a continuous 91 hrs period compared to an un-insulated tent:

• Noise suppression added benefit.

• New 2-year program starting in FY10 to mature manufacturing technology.

• FST POC: Liz Swisher
**Description:** Lightweight, multi-layer honey-comb structure that transports flat, deployed on site using inflation. Commercial product developed by Fi-Foil, Inc. being adapted for use and evaluation in mobile military shelters.

**Capability/Impact:** High level of insulation provided in minimal transport weight and cube configuration. Stand-alone panel provides an R-value of 5.

**Current Status:** 1st generation full-scale prototype systems being designed and fabricated for testing in TEMPER frame-supported and airbeam tents.

**FST POC:** Chris Aall
Radiant Floor Heating for Shelters

- Exploring radiant heating system for shelters:
  - quality of heat is more consistent throughout the shelter.
  - the majority of heat remains within the first 6 feet of living area.
  - operation is 100% silent.
  - less energy is consumed theoretically, not yet proven in full-scale testing

- Tested first generation prototype from HotMesh, Inc.

- FST POC: Chris Aall
Family of Collective Protection Shelters

- Develop low cost ColPro for Military and Civil Defense applications
  - Mobile Shelter System
  - Small Interior Shelter
  - Fly Col Pro

- Industry Partner: Production Products, Inc.

- Sponsor: Congressionally Directed

- FST POC: Tom Larkham
Reactive Airlock for Col Pro Applications

- New airlock technology concepts exploring reactive media and materials while minimizing impact on the target application in regards to stowage and operational volume, power and unique logistical implications.

- Team includes Natick, Tyndall AFB, Technical Products, Inc., Warwick Mills, Inc., Louisiana State University

- Sponsor: DTRA

- FST POCs: Jean Hampel, Kristian Donahue
CB Closure Testing

Hydrostatic

Tensile

• DTRA program
• Technical Products, Inc. contractor
• FST POC: Kristian Donahue

Full Scale Prototyping

Durability
Self-Detoxifying Polymer Systems for Chemical and Biological Warfare Agents

- Self-detoxifying polymer-coating for collective protection shelter materials that rapidly and effectively reacts with and destroys chemical and biological warfare agents (CBWAs).

- Generation of hydrogen peroxide ($H_2O_2$) \textit{in-situ} from oxygen and water present in the environment.

- Trigger for reaction will be CBWA stand off detector.

- Congressionally directed project with Crosslink, Inc.

- FST POC: Julia McAdams
Agent Indicating, Decontaminable, Barrier Material

- Improve existing CB textile barrier materials by incorporating visible detection and self-decontamination into the material.

- Industry Partner: Lynntech, Inc.

- Sponsor: SBIR- Phase II

- FST POCs: Julia McAdams, Kristian Donahue
Test Methods for Toxic Industrial and Battlefield Contaminants

- Develop swatch permeation test methods for the Test and Evaluation of IP and ColPro materials against TICs.
  - Industry Partner: Battelle
  - Sponsor: DTRA
  - FST POC: Julia McAdams
Collective Protection for Military Working Dogs

- 2 CBD SBIR Phase II’s
  - Technical Products, Inc
  - Agave Biosystems/Gentex, Inc.

- Multiple concepts being explored
  - Powered and non-powered
  - CB protection integrated into kennel
  - CB protective “garage” for standard kennels

- FST POCs: Julia McAdams, Clinton McAdams