Expeditionary Basing and Collective Protection Directorate

Fabric Structures Team

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US ARMY RDECOM

Fabric Structures Team Overview

***FST Goal:*. Advance technologies related to fabric shelter systems energy reduction and base camp equipment.**

Technologies:

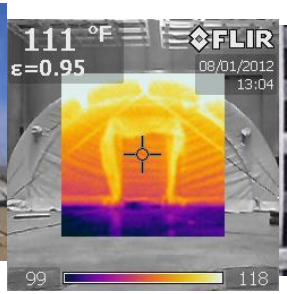
Advanced fabric structures including airbeam shelters :
- **Maintenance Shelters**
- **Mobile Warehouses**
- **Large Command Posts**
- **CB Medical**
- **Backpackable**

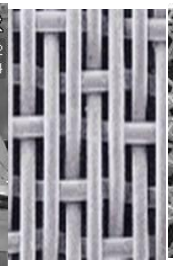
Textiles
Energy Saving Insulation
Radiant Floor Heating

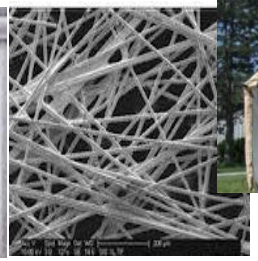
Collective Protection – CB Defense:
- **Overpressure/Negative Pressure Shelters**
- **CB Fabrics**
- **Reactive Airlocks**
- **Self-Decontaminating Fabrics**

Life Support Systems
- **Water Demand Reduction**
- **Black Waste Treatment**

The Team:
- **Jean Hampel - Team Leader, Mechanical Engineer**
- **Tom Larkham - Equipment Specialist**
- **Kristian Donahue - Chemical Engineer**
- **Robin Szczuka – Chemical Engineer**
- **Liz Swisher – Electrical Engineer**
- **Chris Aall – Mechanical Engineer**
- **Clinton McAdams – Mechanical Engineer**
- **Allyson Stoyle – Chemical Engineer**
- **Patti Cummings – Admin Support**

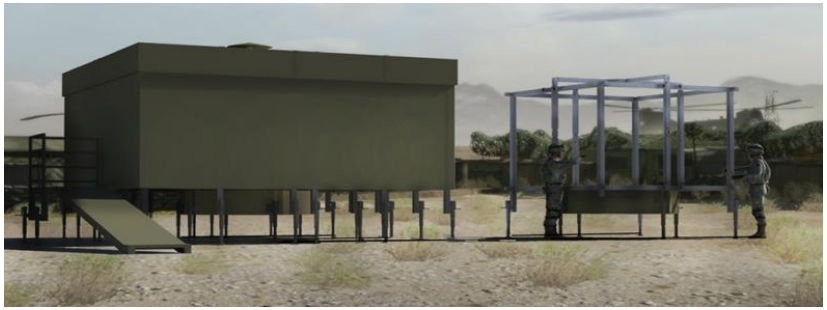






Woven vs. Nonwoven

Self Sustaining Living Module (SLiM) – Leidos, Inc. Rapid Innovation Fund Project



Purpose:

- Study the complex Contingency Basing inter-relationships of habitation, life support and organizational equipment
- Design and fabricate a SLiM that provides life support functions for approximately 20 Warfighters into a global architecture with scalable infrastructure capabilities

Key Features of Leidos, Inc. Design:

- High energy efficiency
- No MHE Required
- Will demonstrate new vacuum wall panels with high R-value
- High quality of life
- Full-scale prototyope will be demonstrated in FY15

Minimized Logistics Habitat UniT (MILHUT)
Technical Products, Inc.
Rapid Innovation Fund (RIF) Project

3 Tri-Con Module Concept:

• A ‘Hotel’ module that includes:
- o Shower (with managed water flow)
- o Toilet (very low water flow, waste incinerating)
- o bathroom sink
- o laundry (manual washing machine)
- o galley with sink (for heating MRE and limited preparation of fresh food)
- o grey water treatment system (recycles grey water into potable water)
- o black water disposal system (incinerates black water)
- o potable water storage (with continuous sterilization)
- o possibly storage of recreation equipment (free weight set with rack/bench)

• A ‘Power/HVAC’ module that includes:
- o PV panel storage
- o Wind power turbine system
- o Back-up fuel cell or generator (JP8 or diesel)
- o Battery power storage system
- o Evaporative cooling system
- o Fuel fired heater (JP8 or diesel)
- o Fuel tank
- o Supporting sub-systems (e.g. power distribution cabling, etc.)

• An optional ‘Storage’ module that could include:
- o Storage of PV or wind energy system
- o Storage of OTP panels
- o Tent storage
- o Bunk and furniture storage
- o Storage of recreation equipment (free weights, tables etc.)
- o Etc.
- o And be used as a dining/work/rest area once emptied.

MInimized Logistics Habitat UniT (MILHUT)

- The Phase I, 1st year, design and fabrication of 2 MILHUT systems:
  - unitary 20-ft ISO variant
  - set of three TRICON modules.

- After user trials, the system configuration will be down selected to one design.

- 2nd generation prototype redesigned & fabricated inI 2nd year

Galley side of hotel module

Water Treatment side of hotel module

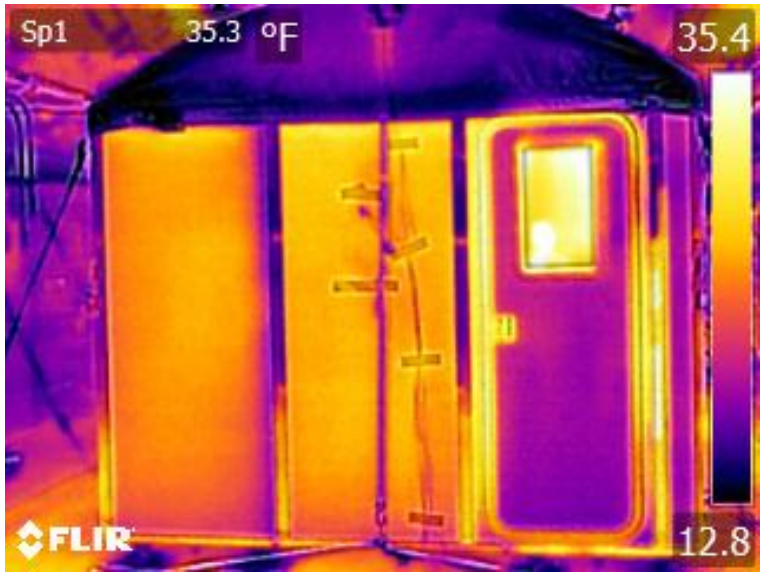
NSRDEC/CRREL Collaboration
NSF Austere Weather Shelter (SBIR)

Requirements:

1. -70F to 125F
2. 100mph winds
3. 20 min deployment
4. Intuitive setup
5. 400 sq. ft. living space
6. Small vehicle maintenance

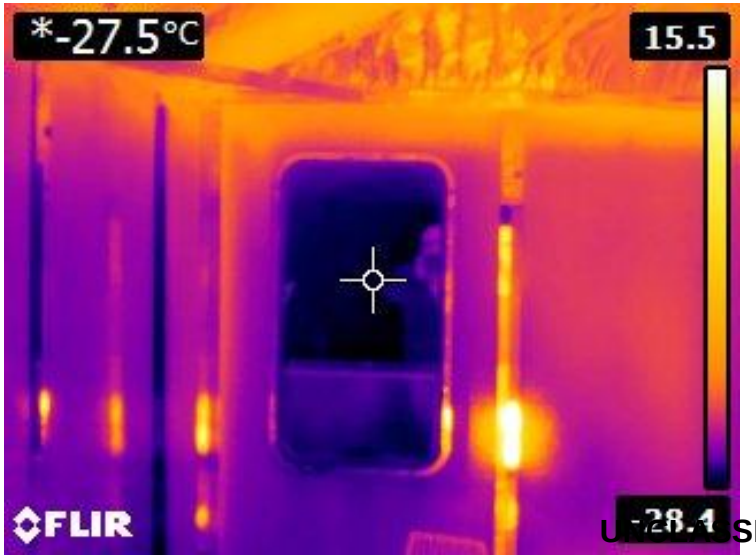
Climatic Chamber Arctic Testing
Infrared Thermal Imaging

Before insulation, R~18

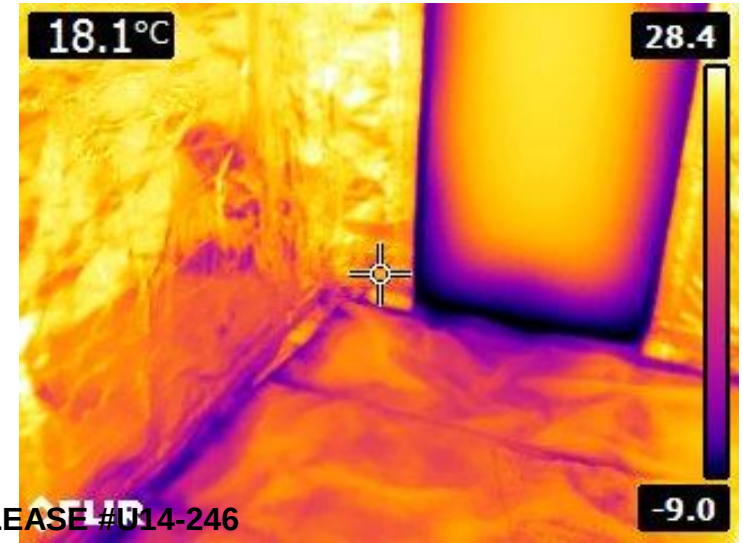


Exterior: Yellow is Bad

After insulation, R~30



Interior: Blue Is Bad



Chemical/Biological (CB) Protected Airbeam TEMPER – 1G Prototype

- Provides protection on a chemical/biological agent contaminated battlefield
- Exterior non-CB skin replaced by new CB resistant skin fabric manufactured by Bondcote
- Rapidly deployable inherent CB protection without insertion of separate liner
- Shelter fabric is a certified ColPro material made by Bondcoat
- 1st Generation prototype shelter with inflatable airframe and novel inflatable bump-thru doors
- Sponsor: Army Medical Materiel Development Activity (USAMMDA)

Chemical/Biological (CB) Protected Airbeam TEMPER – 2G Prototype

- 2nd Generation prototype shelter recently completed

  Improved version of BondBarrier™ Chemical and Biological Protective Fabric

- New frame supported airlock with bump-thru doors

- Currently undergoing simulant testing at Eglin Air Force Base

MANTECH: High Performance Chemical/Biological (CB) Agent Resistant Shelter Fabric

- New 11 oz CB fabric nearing completion at Warwick Mills, Inc.
- Matured through MANTECH program
- Material Performance and Optimization
  - T-11 Laminate Performance
  - Lamination Process optimization
- Scale-up Full-Width Production
  - Mass and Cost Reduction
  - Full width Coating Trials
  - Weaving trials
  - Lamination Trials
  - Manufacturing laminate spec testing