

## Manufacturing Technology for Energy Efficient Expedient Shelters

### PROBLEM / OBJECTIVE

Insulation for military tents consisted of lofted insulation liner kits which would soak up moisture and decrease thermal efficiency while increasing weight and pack size. Non-woven composite insulation is effective, but techniques used to bond textiles to the insulation had to be developed in order to produce them.

The objective of this project was to increase thermal performance, enhance reliability, and reduce cost for a lightweight, thermally efficient, easy-to-transport shelter insulation solution through improved manufacturing technology.

### ACCOMPLISHMENTS / PAYOFF

**Process Improvement:** This Army ManTech project investigated potential manufacturing methods to include ultrasonic textile welding, impulse, flame lamination, spray lamination, dry web lamination and adhesive lamination. The project also improved manufacturing process by utilizing a novel “jump and tack” stitch pattern versus a continuous, straight line stitch. Technical demonstrations included:

- Enhanced manufacturing capability through multiple full-scale prototype tent liners – for both the standard 32’ Tent, Extendable Modular Personnel (TEMPER) and TEMPER Air-Supported (AS)
- Improvements in the liner package that reduced transport cube
- Improved performance resulting in an effective R-value (or system R-value) ~ 6-7

### Implementation and Technology Transfer:

The improved liner system was transitioned to PM Force Sustainment Systems (PM-FSS) and added to GSA contracts to provide direct route to acquisition. The liner system was implemented on 59 Force Provider equipped base camps. There were over 2,500 TEMPER systems purchased for Force Provider.

Future technology transitions include: NASA’s Habitat Deployable Unit, and U.S. Army Medical Materiel Development Activity (USAMMDA) combat support hospitals.



**Non-woven Insulation Liner hung within a TEMPER AS**



**Tent, Extendable, Modular, Personnel – Air Supported (TEMPER - AS)**

### Expected Benefits and Warfighter Impact:

This program enabled an expedient insulation solution for soft-wall shelters providing significant energy savings. Soldiers experience higher quality of life due to better climate control and ease of shelter set-up.

- The acquisition cost of the improved liners decreased by 3%
- Significant cost savings result from reduced fuel consumption since the liner reduces energy use by 30-40%
- Cost Benefit of \$3.3M with Return On Investment (ROI) of 2.7:1

### TIME LINE / MILESTONE

Start Date	March 2012
End Date	September 2013

### FUNDING

U.S. Army ManTech	\$1.3M
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### PATICIPANTS

U.S. Army RDECOM Natick Soldier Research, Development and Engineering Center (NSRDEC)  
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