



Advances in Rapidly Deployable Expeditionary Infrastructure

CMEA Annual Conference

Nov 25th, 2015

Ottawa

- World's largest supplier of rapidly deployable, expeditionary infrastructure solutions to military and government customers.
- In Canada we are currently providing equipment for:
 - DND - CANSOFCOM, 1 Cdn Field Hospital, 1 Engineer Support Unit, CF units throughout Canada.
 - First Responders – Heavy Urban Search and Rescue teams in each province, Provincial Police, Provincial Emergency Medical Assistance Teams.
- Systems used throughout the world in 74 countries and by over 60 militaries. Over 100,000 shelters deployed worldwide.
- Experts in Camp Design and custom requirements.
- Headquartered in Solon, OH. Over 750 employees.
- Only non-US manufacturing plant in Belleville, ON.



Solution	Market Position	Selected Examples
Tactical Shelters & Accessories	#1	 
Environmental Control Units (ECUs)	#1	 
CBRN Filters and Filter Systems	#1	 
Military Heaters	#1	 
Integrated Power / Environmental Control Units	#1	 
Military Generators	#4	 

- **Most engineering efforts currently aimed at:**
 - Reducing packed size.
 - Reducing weight.
 - Energy Efficiency/lower fuel consumption
 - Optimizing Logistic footprint
 - Development of integrated solutions that encompass all of the above.

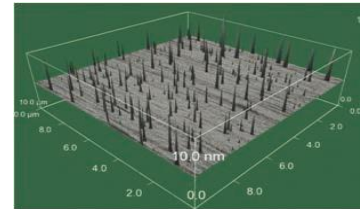
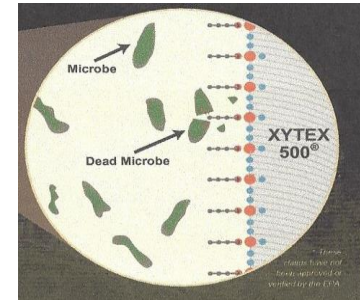
- **Moving away from just shelter systems to the provision of totally integrated solutions that allow efficient management of:**
 - Power;
 - Environmental Conditioning;
 - Water and Waste;
 - Fuel;

- **Shelter design and energy efficiency R&D are our current “hot topics”.**

Shelter Design

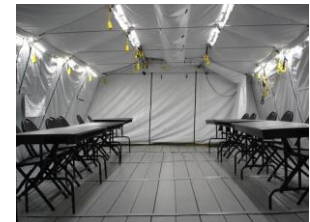
Anti-Microbial liners.

- XYTEX500 is a new shelter fabric developed to inhibit the most resilient bacteria and microorganisms including mold, mildew and fungus. Inside the shelter fabric a microscopic bed of nano-sized spikes lie in wait to puncture the cell walls of invading microbes, killing them as they come to rest on the shelter's surface. Independent studies show it significantly impedes the growth of gram- positive gram-negative bacteria, algae, yeast and fungi, and black mold.
- Anti-microbial properties are permanent and do not fade over time. Permanent for life of fabric.
- Embedded on shelter liner during manufacturing process.
- Same look and feel as ordinary shelter liners.



Multi-function liners.

- Incorporation of miniature LED lighting technology into the shelter liner that will enable lights to be packed with the shelter. Flexible strips of LED lights will be integrated into the liner during manufacture and will fold/unfold when the shelter is erected or struck.
- More effective thermal insulation to provide greater reduction in power consumption for heating/cooling and greatly reduced fuel consumption in the field. Currently we are getting around 50% reduction in fuel consumption, target is 75%.
- Use of electro-textiles to provide power and data throughout the shelters without the need for lots of cabling.



Universal Boots

- Integration of booting features into shelters (eliminating unnecessary components) and creating designs to accommodate multiple shelter attachments, vehicles, hard-wall shelter configurations and building entrances.

■ Heater Design

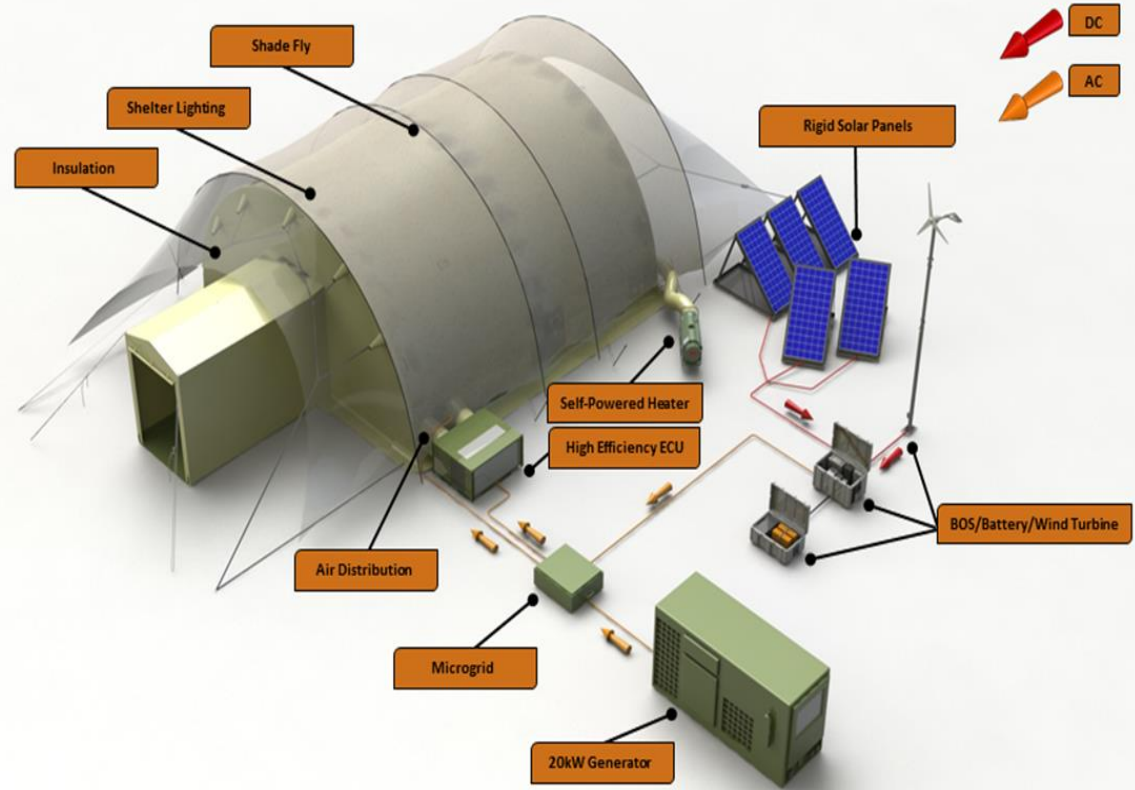
- Multi-Fuel Consumption for heaters including fuel additives for cold weather environments.
- Heating efficiency improvements including multiple heating levels.

■ Air Conditioner Unit Design:

- Evaluate optimal filtration methods for dust environments. Including partial inertia dust separators to minimize loading on filters.
- Efficiency: Making ACU improvements to improve efficiency from SEER 14 to higher ratings.

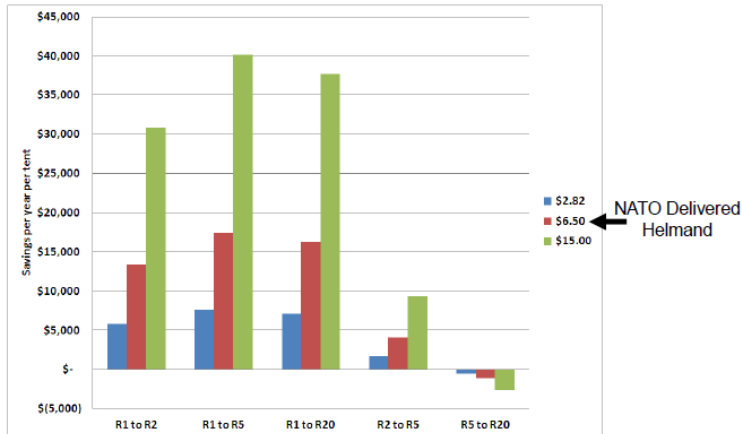
■ Power

- Solar Power and renewable energy sources to reduce energy consumption requirements.
- Power Distribution for expeditionary base camp.
- MicroGrid Power Distribution and Energy Storage including Intelligent Power Technology (IPT™).



- Use a systems approach to integrating energy efficient solutions into hybridized systems whose purpose is to reduce fuel consumption and enhance operational effectiveness.
- Ensure systems are modular and scalable, enabling them to be optimally sized for the mission's requirements.

Shelter insulation – Solar Shade and Radiant Barrier

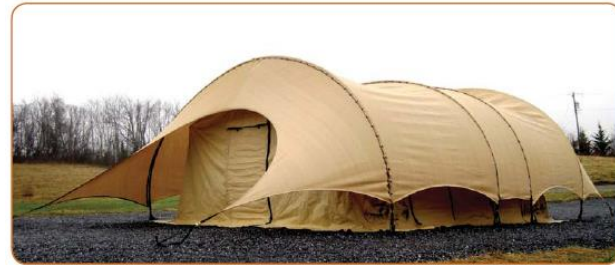


Assumptions:

- Inside tent temp constant 75°F
- Hourly data for Kandahar Airport for 1 year (NOAA)
- 12 Personnel, 5 Computers, 300W of lighting inside shelter (Thermal Load)

One Shelter's Savings per Year

- R1-R2 is a 41% savings or 2,060 gallons / \$13K
- R1-R5 is a 53% savings or 2,687 gallons / \$17K
- R1-R20 is a 50% Savings or 2,515 gallons / \$16K
(All based on Helmand @ \$6.50)
- Foaming tents (R-20) is not optimum due to internal thermal load accumulation
- Greatest savings from R1-R2
- Approx cost of liner \$5K (Based on lessons from ExFOB)
- ROI would be less than six months!



■ Solar Shade

- Works best in temperate climates
- Does nothing in cold climates
- Works well on an unconditioned shelter or container
- Simple to set up



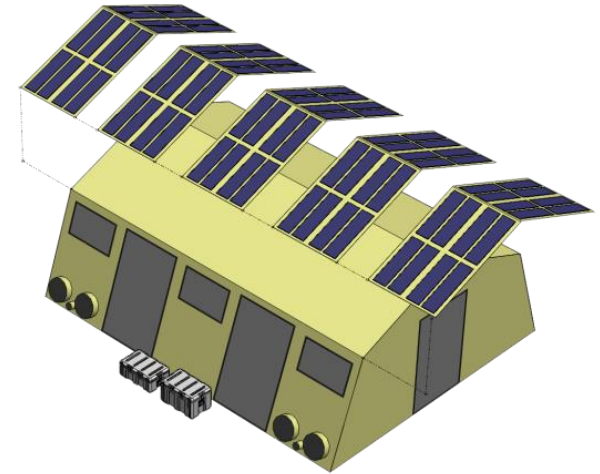
■ Radiant Barrier

- Works in all climates and temperatures
- Minimal set up
- Works best on a conditioned shelter

Expeditionary Power System (EPS)

Advanced Alternative Power Management

- **Manages dissimilar power sources**
- **Harvests and manages alternative power inserts such as Solar, Wind, Micro-hydro, Fuel Cells**
- **Controls access to traditional power sources such as generators and shore power grids to minimize fossil fuel usage**
- **Consists of:**
 - **A mobile, modular and Expandable Solar Array (ESA) in either rigid or flexible forms**
 - **Central Balance of Systems (BOS) unit**
 - **Expandable Battery Platform (EBP)**



Expeditionary MicroGrid

- Single phase microgrid combines EPS units from separate shelters.
- BOS units power single phase loads in each shelter.
- Shelters producing more power than they consume contribute the excess power to the grid. “SELL”
- Shelters consuming more power than they produce take excess power from the grid. “BUY”
- When loads exceed total alternative power generation capacity, the grid controller starts attached generators, recharges all batteries, then shuts off generators.
- EPS units can be removed from the grid to redeploy for use in the field.
- Testing with 900W loads and lead acid battery systems show 35% reduction in generator run time.
- Testing with 900W loads and lithium ion battery systems show 55% reduction in generator run time.



TQG Autostart Module development

- Adds remote start and stop capability to 5KW and 10KW Tactical Quiet Generators (TQG).
- Allows generators to be controlled by advanced power management systems
- Must be easily installed in the field



Smart Control For Legacy Generators