



"Green" Shelters and Dehumidification For Corrosion Attenuation and Improved Maintenance Flexibility

Capt Daniel Doak
Lead Corrosion Engineer, AFCPCO
Project Manager



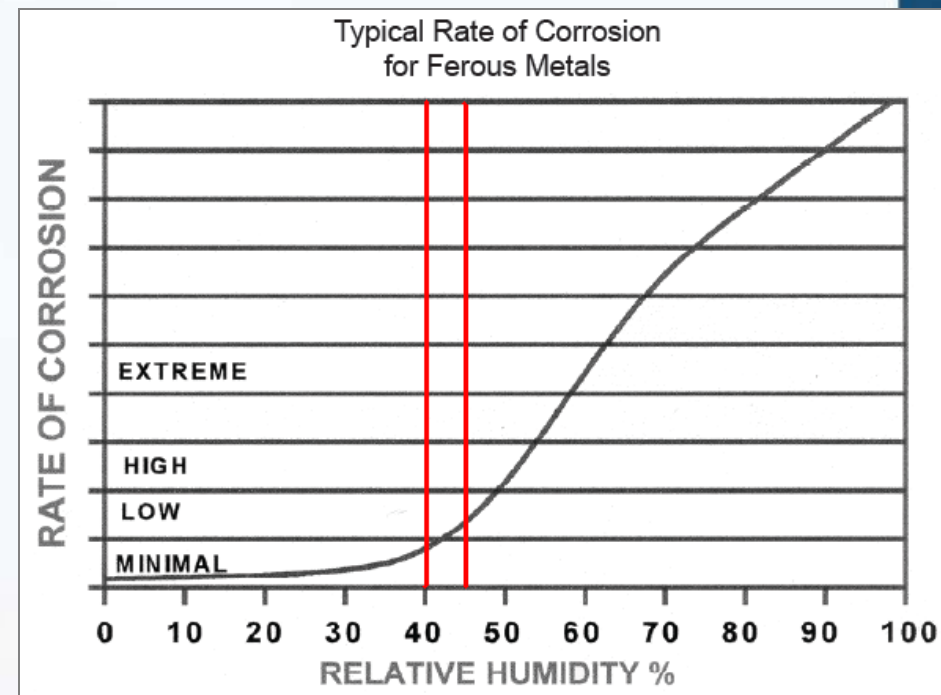


Fundamental Corrosion Control



BREAK THE CORROSION CIRCUIT BY REMOVING THE CONDUCTIVE ELECTROLYTE

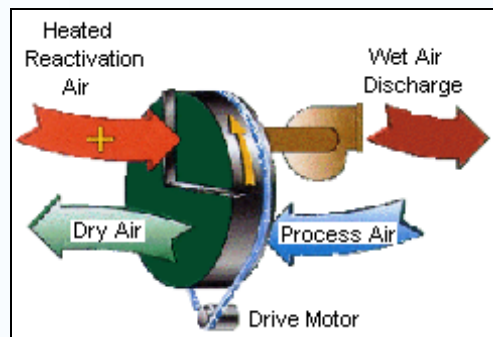
- Humidity vs. Corrosion
 - Corrosion rate increases exponentially above 50% RH
 - Project standard: maintain 40-50% RH
- Other benefits
 - Moisture-related electrical failures decrease significantly below 50% RH
- **“Green” shelter?**
 - Renewable energy to sustain a dehumidified environment
 - Independent of the grid, deployable
 - Considerable return-on-investment for corrosion maintenance activities
 - Open the door to larger-scale dehumidification and other functional, practical applications for renewable energy





The "Green" Shelter Concept

Dehumidification Unit



Renewable energy powers dehumidification equipment (DH)



Deployable Solar Generator

LED lighting also powered by renewable energy

Booth contained in maintenance shelter for added corrosion protection and a comfortable working environment

Soft Wall Maintenance Shelter

Retractable Sealed Booth



Stored AGE

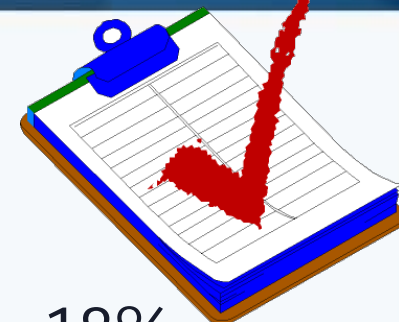
DH maintains dry air in storage booths, protecting AGE equipment from corrosion and moisture infiltration





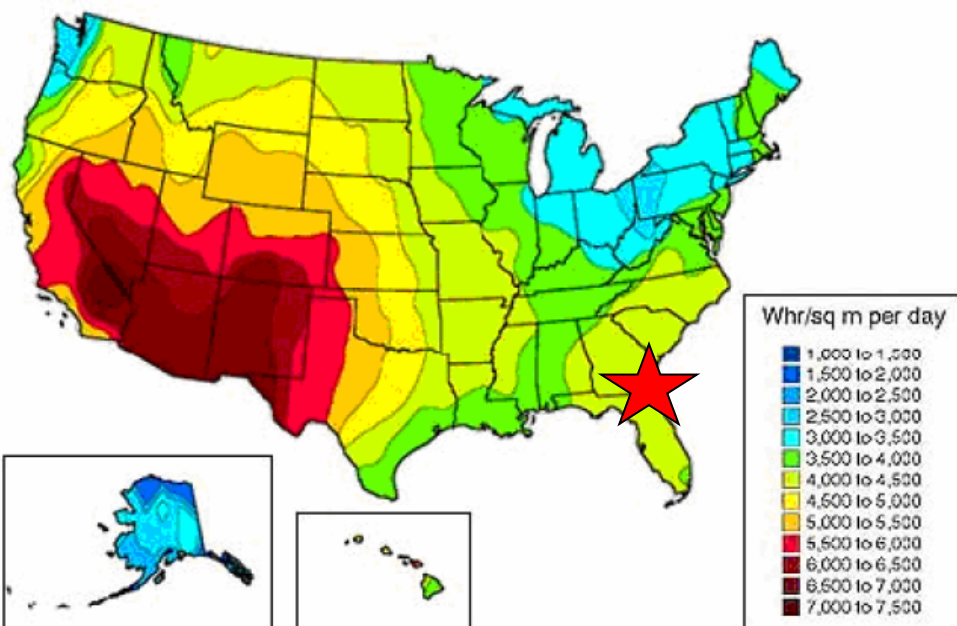
Initial Design Parameters

- Dehumidifier
 - Power Requirement - 1.2kW (total)
 - Duty Cycle (Savannah, summer) - 45%
 - Duty Cycle (Savannah, fall/winter/spring) - 18%
 - Summer Demand - 13.0 kWh/day
- LED Lighting Power Requirement: 250 Watts per bay
- Mobile Solar Generator
 - Capacity – 16.3 kWh/day
- Auxiliary Portable Generator (diesel or gasoline)
 - Capacity – 5 kW





Location and Environment



*Army successfully using dehumidified warehousing at Hunter Airfield, Savannah, GA (conventional power)

- Travis Field, Savannah, Georgia
 - Highly corrosive environment
 - Average solar exposure
 - Distinct seasonal variability
 - Good standing relationship with GA-ANG/CRTC



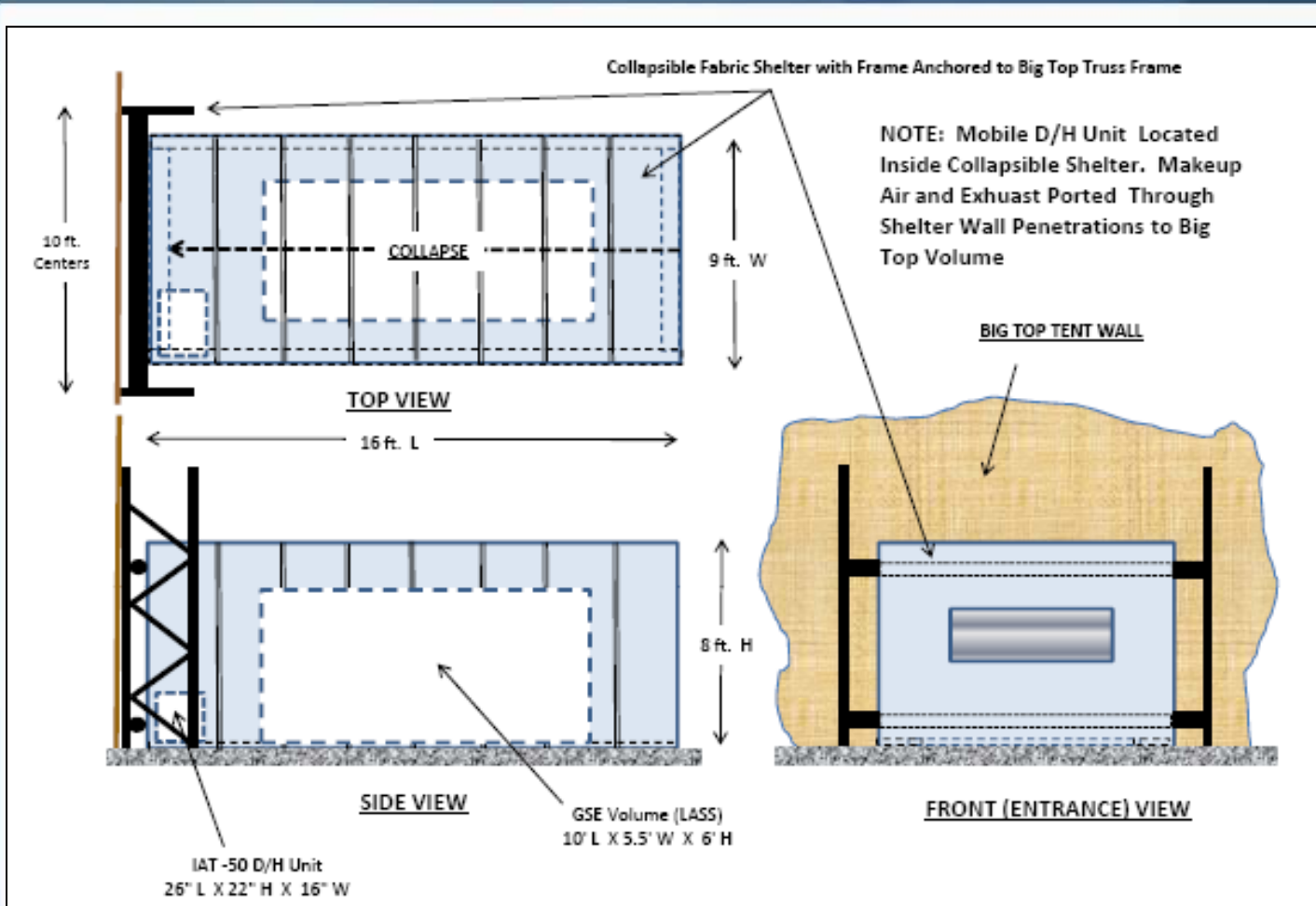
Deployable Shelters

- ❖ “Green” Shelters:
Metal-frame,
tensioned-canvas
maintenance
shelter...NOT sealed
- ❖ Future projects:
Controlled Humidity
Protection Shelters
(CHPS), already used
by Army and Marine
Corps...but powered
by renewable energy





Collapsible Sealed Booth



- Concealed, easy-to-control volume to isolate stored equipment
- Reduced power requirement, greater DH efficiency, reduced leakage



Sensors

- Environmental Conditions, Monitoring and Data Collection
 - Remote sensor with data relay network
 - Data accessible via website or cell-phone
 - Solar, humidity, temperature...
- Corrosion Coupons
 - Si, Cu, Fe, Al
 - 90, 180, 270 and 360-day tests
 - Mass and thickness measurements to identify corrosion rate
- Data collection points
 - Inside the DH booth
 - Inside the shelter, no-DH
 - Outside the shelter, full weather exposure





Data Reduction

- Characterize relative corrosion attenuation of sheltering and sheltering-with-dehumidification
- Corroborate suspected DH effect on materials:
 - Corrosion attenuation for metallic structures
 - Failure prevention of electronic circuitry
 - Dry air effects on rubber and plastics
- Transfer findings to maintenance activities
 - Condition-based maintenance
 - HVM
 - Maintenance work cards
- Apply proven technologies and objective data to aircraft and other systems applications



That's it!



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