



Ogden Air Logistics Center



Ogden Air Logistics Center



U.S. AIR FORCE

JOCOTAS 2-4 May 2005

Composite Technology Insertion
at HAFB

**Air Force Tactical
Shelters/Radomes/Towers
Product Group**

**Terry Holland
OO-ALC/LHH
DSN 777-2860
terry.holland@hill.af.mil**

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Report Documentation Page

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Composite Initiative

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- **Objective**
 - Replace corroded structures with composite materials.
 - Shelters
 - Towers
 - Radomes
- **Advantages**
 - Composites are not subject to corrosion
 - Increased performance
 - Reduced maintenance costs
 - Increased life cycle



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Other Teaming Partners/Sponsors



Ogden Air Logistics Center

- NEXRAD
- FAA
- NOAA
- NWS

- AFMC
- PACAF
- AFSPC
- AFSOC

- JOCOTAS
- ARMY
- NAVY
- Air Force

- LRM Inc. (TCD Inc.)
- WebCore Tech.
- Triton Systems
- RSI Inc.
- SES Inc.
- AHTNA Gov. Services
- CSS Inc.
- ICRC
- Lynntech Inc.
- Diamond Inc.

- Strongwell Inc.
- AK Supply Inc.
- Northern Power Inc.
- ISO Truss Inc.
- ITI Inc.
- AMPRO Inc.
- Touchstone Inc.
- AGS Inc.
- Schafer Inc.
- Goss Inc.

- AFC Inc.
- ATK Composites
- MCECC Inc.
- Total Solutions Inc.
- SUNREZ Inc.
- KaZak Inc.
- Nanosonic Inc.
- Integument Inc.
- Luna Inc.



Composite Shelter Program



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- **Objective**

- Develop new generation of composite shelters meeting a variety of mission requirements
 - Fixed Site shelters
 - ISO, LMS, S280
- Field new shelters at a competitive price
- Reduction of maintenance costs associated with corrosion



System Engineering Approach



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SFR- System Functional Review

PDR- Preliminary Design Review

CDR- Critical Design Review

SVR- System Verification Review

FQT- Formal Qualification Testing

FCA/PCA- Functional / Physical
Configuration Audit



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Tracking Instrumentation Subsystem (TIS) replacement for Stony Range at Eielson AFB



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- **Objective**

- Develop a composite shelter with enclosed power/communications systems to replace 8 existing TIS units



- **Status**

- Completed prototype and subsequent Units
- Installed communications systems with remote monitoring capabilities
- TRR held Mar 2005

- **Upcoming Tasks**

- Qualification Testing
- Installation of 8 shelters FY05

Existing Stony TIS site.



Exterior and interior views of composite shelter built to replace existing Stony units.



Additional Eielson Work

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- **Description**
 - 8 units for use at the Yukon range with the possibility of additional work beyond that
- **Status**
 - On contract
- **Upcoming Tasks**
 - To be completed and delivered to Eielson in the Fall of 2005



Existing Yukon TIS site.



Exterior view of composite shelter designed for Yukon site replacement.



TACAN Shelter for Beale

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- **Objective**
 - Replace severely damaged TACAN building with composite shelter at Beale AFB
- **Status**
 - In communication with Civil Engineering people at Beale to build structure per their specifications
- **Upcoming Tasks**
 - Anticipate additional customers who would benefit from this type of shelter for use with TACAN systems



TACAN building to be replaced



Composite shelter design for replacement of USAFE and ATCALs units.



USAFE Shelter



Ogden Air Logistics Center

- **Objective**
 - Replace corroded weather radar shelter with composite shelter for USAFE
- **Status**
 - Vendor on Contract
- **Upcoming Tasks**
 - Anticipate additional customers who would benefit from this type of shelter



USAFE metallic shelter to be replaced



Composite shelter design
for replacement of
USAFE shelter.



NAVY BMF ISO Shelter



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- **Objective**
 - DEM/QUAL an 8'x8'x20' Composite BMF ISO Shelter
 - Conduct EMD for long-term procurement
- **Status**
 - 2 Prototypes
 - Conducted ISO development testing
 - 6-high stacking demonstrated
 - 3rd prototype under way
- **Upcoming Tasks**
 - ISO Testing 9-high stacking loads.



Joints of Thermoplastic ISO Shelter Prototype, Thermoplastic Prototype Shelter



ARMY LMS Composite Shelter



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- **Objective**

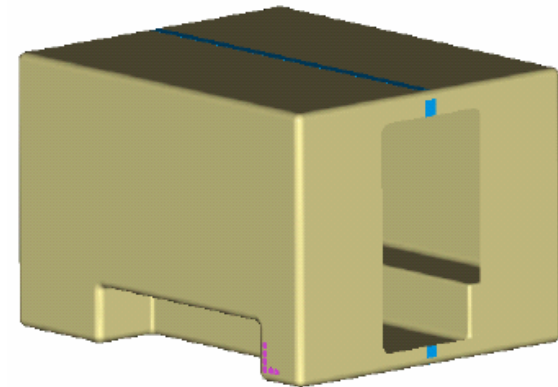
- Develop a light-weight, EMI-protected, HMMWV-mounted, rigid wall LMS composite shelter
- Develop composite EMI technology in partnership with Defense Threat Reduction Agency (Funding through SBIR Program)

- **Status**

- Produced first prototype composite LMS
- Preparing for EMI Testing
- Materials: Graphite skin, foam core, copper mesh

- **Upcoming Tasks**

- Complete EMI Testing



Existing LMS Shelter (Aluminum Skin with Honeycomb Core), Computer Model: LMS Composite Shelter



Composite Shelters Summary



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- **20 Fixed Site Shelters currently on contract**
- **Composite ISO, LMS continuing development testing**
 - Commercialization FY07



VAFB Weather Instrument Towers



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- **Objective**
 - Replace unsafe, badly corroded weather towers with tilt-down composite towers
 - Used SBIR funded composite technology for tower development



Corroded staircase weather tower (VAFB)



Newly erected composite ISOTRUSS Tower (VAFB)



VAFB Weather Instrument Towers



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Climbing was required for servicing



Tilt-down tower facilitates easy service

- Safer for service operations
- Technicians do not need to climb tower



Towers 57 and 58, Erected Dec 2004



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Vandenberg AFB, CA



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Successful Tower Solutions

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- **Tower 60 at VAFB**
 - 60-ft Composite Weather Tower
 - Erected Oct 2003
- **Tower 215 at CCAS**
 - 60-ft Composite Weather Tower
 - Erected May 2003
 - No damage to tower during hurricanes Frances and Ivan



Glideslope Towers



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Composite Glideslope Towers to be installed at:



Corroded Glideslope tower (GUAM)

- Andersen AB, Guam (Est. June 2005)
- Yokota AB, Japan (Est. Sept 2005)
- Misawa AB, Japan (Est. FY06)



Proposed Composite Glideslope Tower



Glideslope Tower Solution



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- Commercially available product (German based company)
- Only tower to meet frangibility requirement (ICAO 2005)
- Improved performance: Deflection <1" at 60 ft and 56 mph wind, Current tower = 3"
- Withstand high wind speeds: up to 400 kph (248 mph)
- Corrosion resistant: Composite design; UV secure paint
- 'Tilt-up' tower design – minimal installation time



Monopole Tower Solutions



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- 14 Monopole Towers to be built for the 45th Space Wing at Cape Canaveral in June 2005





Composite Towers Summary



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- **4 weather towers fielded – 1 at CCAS, 3 at VAFB**
- **1 weather tower on contract**
 - Expect FY05 install at CCAS
- **14 monopoles**
 - Expect FY05 install at CCAS
- **5 glide slope towers on contract**
 - Expect 1st install FY05 at AAFB



Composite Radome Program



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- **Objective**
 - **Develop and field new generation of composite radomes**
 - Less expensive
 - Improved properties
 - Impact resistance
 - Transmission
 - Reduced maintenance



Radome Industry Day



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- **Held 18-19 October 2004 at Hill AFB**
- **11 Radome and plastics manufacturing companies attended**
 - MFG/Ratech
 - Prime Manufacturing Technologies, Inc.
 - L3 Communications/ESSCO
 - Saint-Gobain
 - Starwin Industries
 - ATK (i.e. ATK-MRC and ATK-Composites)
 - Battelle
 - Thermoplastic Composite Designs (TCD)
 - Antennas for Communications (AFC)
 - Composite Matrix Corporation
 - General Dynamics



MILSTAR Radomes



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- **Project Status**

- Project on schedule for deployment 20 May 2005
- Dual thermoplastic/thermoset path being pursued
- RF testing for both designs/materials completed - Both exceed RF requirement
- Mechanical/physical coupon testing ongoing
- Initial FEA for each design complete
- Initial impact analysis complete advanced impact analysis ongoing
- Prototypes for both designs complete



**MILSTAR Radome and Shelter
Depiction—Fixed Site & Transportable**



Program Outlook



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- **MILSTAR Radome success will lead into additional radome projects with AFSPC**
- **PACAF Replacement List**
 - Currently exploring options for AN/FPS-117 Radomes
 - Communicating with Program Office for VOR, VORTAC, and TACAN systems



Cape Newenham, AK



Cape Romanzof, AK



Program Outlook

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Working with the Navy for “Low Risk” Composite Shipboard Equipment Shelters/Radomes/Towers

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SBIRS SUPPORTING TECHNOLOGY DEVELOPMENT



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SBIR Projects
Develop composite ISO shelter
Develop composite LMS shelter
Develop UV resistant composite materials
Develop chemical, biological, radiological agent resistant composite materials
Develop thermo-plastic materials replacement for composite or metal shelters
EMI for Fixed Site Shelters
Automated pigmentation for composites
Alternative Energy Source for APU

SBIR Projects
Develop low cost, high tensile strength composite materials
Develop advanced composite structural solution for tall, narrow structures
Vinyl Ester Resin (VERs) without Volatile Organic Compounds (VOCs)
Thermoplastic Large, Ground-Based Radomes
Fire resistance
Composite roller bearing