JOCCOTAS
2-4 May 2005
Composite Technology Insertion at HAFB

Air Force Tactical
Shelters/Radomes/Towers
Product Group

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Composite Initiative

- **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
### Other Teaming Partners/Sponsors

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Composite Shelter Program

• **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

- 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

• **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
Additional Eielson Work

- **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
TACAN Shelter for Beale

- **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
USAFE Shelter

• **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

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NAVY BMF ISO Shelter

• **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*
• **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
Composite Shelters Summary

- 20 Fixed Site Shelters currently on contract
- Composite ISO, LMS continuing development testing
  - Commercialization FY07
VAFB Weather Instrument Towers

- **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

Tilt-down tower facilitates easy service

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

Climbing was required for servicing
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Ogden Air Logistics Center

Towers 57 and 58, Erected Dec 2004

Vandenberg AFB, CA
Successful Tower Solutions

- **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
Composite Glideslope Towers to be installed at:

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

- 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

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

- 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

• **Objective**
  – Develop and field new generation of composite radomes
    • Less expensive
    • Improved properties
      – Impact resistance
      – Transmission
      – Reduced maintenance
Radome Industry Day

- 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

• **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
Program Outlook

• 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

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

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## SBIR Projects

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<td>Develop composite ISO shelter</td>
<td>Develop low cost, high tensile strength composite materials</td>
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<td>Develop composite LMS shelter</td>
<td>Develop advanced composite structural solution for tall, narrow structures</td>
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<td>Develop UV resistant composite materials</td>
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<td>Develop chemical, biological, radiological agent resistant composite materials</td>
<td>Thermoplastic Large, Ground-Based Radomes</td>
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<td>Develop thermo-plastic materials replacement for composite or metal shelters</td>
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<td>EMI for Fixed Site Shelters</td>
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