



Fabric Structures for Corrosion Prevention



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To provide information about the Shelter Technology, Engineering and Fabrication Directorate (STEFD) & PM Force Sustainment Systems (FSS), prototype fabric structures and currently available shelters that will assist the Warfighter with Corrosion Prevention and Control in specific corrosive environments

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- Overview of STEFD & PM FSS
- Corrosive Environments
- Protection from Weather
- STEFD Textile Technology and Prototyping
- Fabric Structures available and the protection they provide
- Conclusion

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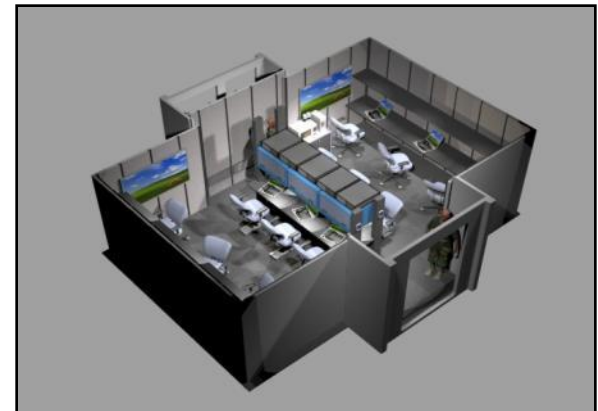
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Shelter Technology, Engineering & Fabrication Directorate



- Collective Protection Team
 - Development of Collective Protection Systems
 - Engineering Support to Fielded Systems
- Composite Structures Team
 - Shelter Development & Integration
 - Transportability Certification
- Design, Engineering & Fabrication Team
 - Rapid Prototyping & Mechanical Assemblies
 - Engineering Design & Reverse Engineering
 - Test & Analysis
- Fabric Structures Team
 - Collective Protection Technologies
 - Advanced Textile Materials & Structures
- Special Projects Team
 - Ballistic Protection for Shelters
 - Energy Management Technologies



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Tentage Prototype Shop

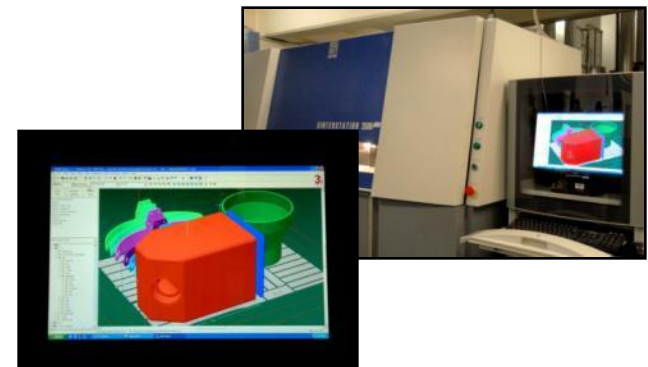
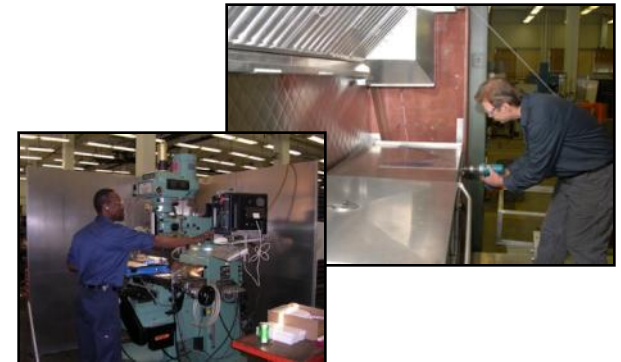
- Design and fabrication of tentage prototypes, accessories, special purpose covers and C/B resistant liner systems

Mechanical Fabrication & Assembly Shop

- Full service machine shop capable of fabricating prototype systems, refurbishing equipment degraded in the field, and modernizing and upgrading equipment

CAD & Rapid Prototyping Cell

- Creates 3-D CAD models, conducts engineering studies, finite element analysis and produces 3-D rapid prototypes from CAD data



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- PM FSS has life cycle management responsibility for more than 45 ACAT III programs with a total budget in excess of \$0.5B over the POM.
- These programs provide direct and indirect life cycle support to soldiers in virtually any environment to include training, contingency and combat operations.
- 5 different product lines: Field Feeding Equipment, Field Services Equipment, Shelter Systems, Aerial Delivery Systems, and Force Provider.

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- Fabric shelters provide protection against a number of environments that can accelerate metal corrosion
 - Moisture: greatest contributor to deterioration of metals
 - Temperature: corrosion rates increase as temperature rises
 - Sand, coral and mud: abrasion and wear of moving parts and coatings
 - Sunlight: breaks down coatings that leave metallic surfaces unprotected

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- Protection of the equipment from weather is one way to prolong its service life and cut back on the amount of maintenance required.
- Keeping vehicles or equipment stored under simple open-sided covered structures can reduce exposure to rain and direct sunlight.
- Completely enclosed structures are even better, and the best is a structure with a dehumidification system.

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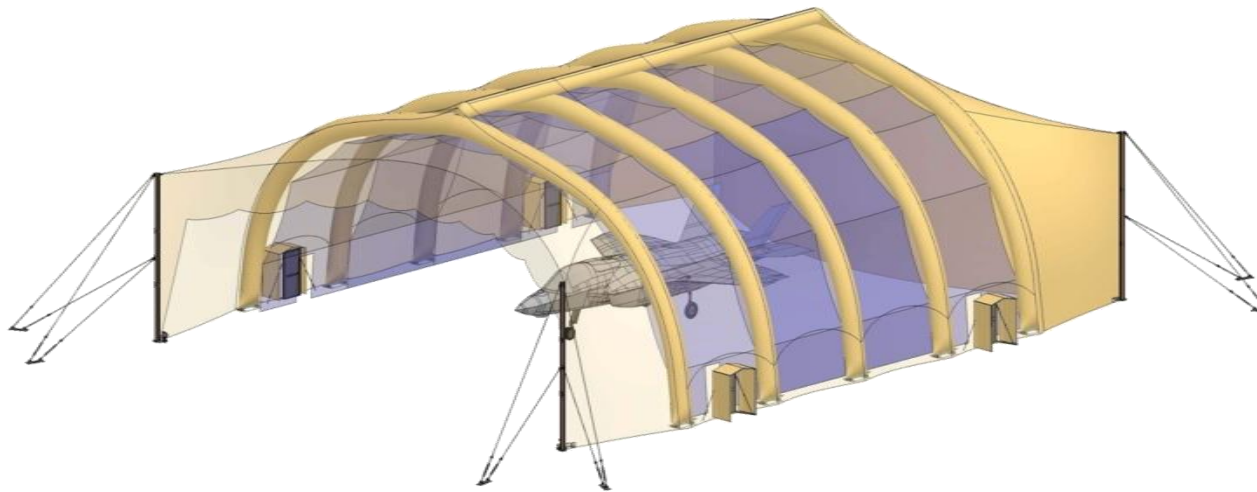
- Environmental Protection
 - Moisture, Sand/coral/mud, Sunlight
- Selectively Permeable Materials
 - Controlled air permeability
- Chemical & Biological Protection
- Reactive Materials



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- Structural Textile Design
 - Military technical performance
- Specialty Material Expertise
- Tailored for Various Customer Needs & Applications
- Machine Shop
- Rapid Prototyping



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- There are many prototype fabric structures and standard shelters available to provide protection to military equipment and facilities
 - Airbeam Technology
 - Medium Airbeam Shelter (MASTER)
 - Aviation Inflatable Maintenance Shelters (AIMS)
 - Ultra-Lightweight Camouflage Net System (ULCANS)
 - Lightweight Maintenance Enclosure (LME)
 - Large Area Maintenance Shelter (LAMS)
 - Advanced Solar Cover (ASC)

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- Load Bearing Pressurized Fabric Structures
- Outstanding Strength to Weight Ratio
- Rapid Deployment with Reduced Time & Personnel
- Deflect Without Damage When Overloaded
- Advances Over Commercial Inflatables
 - Seamless Tubular Fabrication
 - High Pressure → Reduced Diameter & Surface Area
 - Optimized Design through Modeling and Simulation



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Fabric Structures Medium Airbeam Shelter



- Ground vehicle & small aircraft maintenance
- 52 ft. by 40 ft.
- 14-in. diameter high pressure airbeams
- 463L pallet compatible



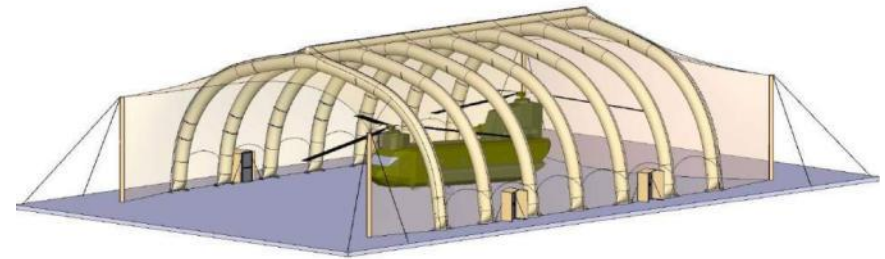
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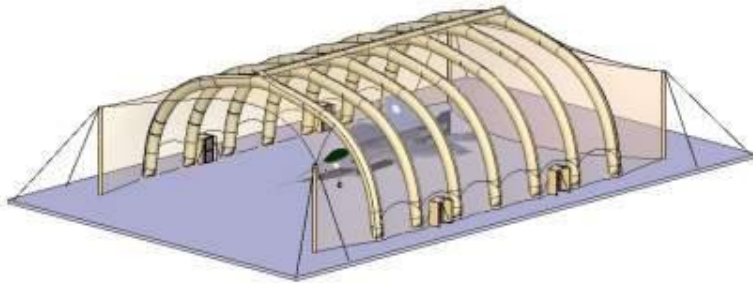
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First Generation Prototype, 2001



CH-47 Chinook



F-22 Raptor



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Fabric Structures Aviation Inflatable Maintenance Shelter (AIMS 2G)



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Fabric Structures Airbeam Technology



- Protects ground tactical vehicles and aviation assets from multiple corrosive environments (moisture, sand, and sunlight)
- Designed for extreme environments
 - 10 psf snow load
 - 65 mph winds
- Tents can be closed providing the protection to internal vehicle parts as they are exposed during maintenance operations

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- Provides multi-spectral cover, camouflage, concealment and deception
- Reduces visual, thermal, infrared and radar signatures
- Rhombus and hexagon shapes, can be connected to form nets for larger positions. 1-1.5 systems per HMMWV, 2 per 5 ton, 2-3 per medium-large tent etc.
- Special mission configurations can be made to accommodate unique sizes and/or mission profiles, large scale sizing etc.

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- Many secondary benefits
 - 80%-90% reduction in solar load demonstrated
 - reduces environmental control unit (ECU) demands
 - Recent tests reflect a 22% average reduction in ECU power requirement and improved ECU efficiency
 - Protects equipment (tactical vehicles, structures, etc) from corrosive environments (sunlight and temperature)
 - Testing being conducted on the protection being provided from UV exposure on fabric (ie fuel and water bags)

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- A frame supported lightweight shelter designed to provide units with a covered facility to conduct tactical maintenance operations.
- It is a modification of the Tent, Extendable, Modular, PERsonnel (TEMPER) where extensions are added to the tent frame to add the height needed for enclosure of tactical vehicles and equipment.
- The end walls have been modified with sliding fabric doors permitting total enclosure during conditions of extreme weather or blackout.

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- Protects tactical vehicles from multiple corrosive environments (moisture, sand, and sunlight)
- Tent can be closed providing the protection to internal vehicle parts as they are exposed during maintenance operations

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- Large Area Maintenance/Repair Shelter for Helicopters, Tanks, and Wheeled Vehicles
- 75' W × 190' L × 31' H; Length is Modular in 12.5-ft. Increments
- Floor Area: 12,500 sf; Shelter Weight: 26,700lbs; Cube: 797 cu. ft.
- Set Up: Trained Crew is required. Typical set up time is 6-10 days by 10 person team.
- Features:
 - Lighting and Electrical Distribution System
 - Electric Winches for Endwall Doors - Manual back up

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- Protects tactical vehicles (helicopters, tanks and wheeled vehicles) from multiple corrosive environments (moisture, sand, and sunlight)
- Tent can be closed providing the protection to internal vehicle parts as they are exposed during maintenance operations

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Type I



Type II

- Protects Warfighters, equipment and supplies from harsh solar loading
- Lightweight fabric, open weave material, allow hot air to escape
- Complexible side to side & end to end to cover multiple shapes and sizes
- Pole supported (aluminum, telescoping)
- Reduces solar effects by 60% Vehicle drive through capability

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- STEFD has the facilities, expertise and experience to combine textile technologies and user requirements to produce shelters that assist with CPC
- PM FSS manages many standard fabric shelters that are available today to assist with CPC
- There are many fabric shelters available that provide protection against the many corrosive environments that exist
 - Airbeam Technologies (MASTER, AIMS)
 - ULCANS
 - Shelters (LME, LAMS)
 - ASC
- All of these shelters are available to assist the Warfighter with Corrosion Prevention and Control

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